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ABSTRACT

The manual contains the Pre-Speech Assessment Scale (PSAS) intended for use with cerebral palsied and other handicapped children to evaluate behaviors at the birth through 2-year age level. Introductory information covers the development of the PSAS, concepts underlying the PSAS, evaluation procedures, scoring the PSAS, and graphing procedures. The scale examines 27 pre-speech performance areas in the categories of feeding behavior, sucking, swallowing, biting and chewing, respiration-phonation, and sound play. Each behavioral category is preceded by evaluation guidelines, information on physiological aspects, common definitions, and general information on scoring. Each specific skill includes a description of the testing procedures, specific scoring information, and a behavioral description of the various levels of the skill. A double scaling system allows either ordinal or developmental scores. Sample skill areas evaluated by the PSAS include sucking liquids from the bottle or breast, swallowing semi-solids, moving the jaw in biting and chewing, maintaining voice quality during non-speech phonation, and engaging in spontaneous sound play. Among 14 appendixes are a pre-speech assessment letter to parents, a questionnaire for parents, a list of materials needed for the PSAS, directions for making a recording of the child's sounds and speech, and a recording sheet for elicited and spontaneous sound production. (DB)

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# PRE-SPEECH ASSESSMENT SCALE

## A Rating Scale for the Measurement of Pre-Speech Behaviors from Birth through Two Years

By

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Curative

August, 1982

Dear PSAS User:

The Comprehensive Training Program for Infant and Young Cerebral Palsied Children (C.P. Project) at the Curative Rehabilitation Center has been the sponsor for the development of the Pre-Speech Assessment Scale (PSAS) since 1971. In this role, we have been extensively involved in not only the organization, planning, and editing of the PSAS, but also in the training of individuals in its use through special C.P. Project workshops and through Advanced Neuro-Developmental Treatment Speech Courses.

The PSAS is now entering a new phase in its development through the general distribution of this publication by the J.A. Preston Corporation to individuals, such as yourself, who may not have attended a course in its administration. This, of course, poses some new questions concerning the PSAS, especially in regard to its clarity, organization, and the need for training in its use.

Recognizing the need to investigate these questions, the C.P. Project proposed a means by which information could be gathered from and provided to those purchasing the Pre-Speech Assessment Scale which the J.A. Preston Corporation enthusiastically supported. Therefore, we request that you review the accompanying PSAS Follow-Up Procedures (Blue Sheet) and hope that you will choose to complete the enclosed three forms, returning them to the specified address. If more than one individual is using this PSAS manual, please feel free to copy these three forms so that each person can participate.

Even if you choose not to participate in the described PSAS Follow-Up Procedures, your experiences with the use of the PSAS are of great importance to us. Please complete a Confusions and Uncertainties in Scoring form (See page 243 of the PSAS manual) whenever questions concerning scoring arise and send it to us at the address noted on the bottom of the form.

We hope that you will see the value in participating in the PSAS Follow-Up Procedures. However, if you elect not to participate, we trust that you will find the Pre-Speech Assessment Scale a valuable tool in the evaluation and/or on-going treatment of children with pre-speech and feeding disorders.

Sincerely,

Rona Alexander

Rona Alexander, Ph.D., CCC-S
Director
Comprehensive Training Program for Infant and Young Cerebral Palsied Children

Curative Rehabilitation Center
9001 Watertown Plank Road, Wauwatosa, Wisconsin 53226 • Telephone (414) 259-1414
Providing comprehensive outpatient services to children and adults with physical, mental and developmental disabilities

PRE-SPEECH ASSESSMENT SCALE
FOLLOW-UP PROCEDURES

1. Pre-Speech Assessment of Alysia

This unscored Pre-Speech Assessment of Alysia (White form) has been provided for completion as a way in which you can find out how well you have interpreted the PSAS scoring procedures. In addition, it will provide us with some information on the clarity of the scoring instructions in the manual and the successful use of the PSAS without regard to an individual's background or experience in observing pre-speech and feeding skills.

First, we request that you become thoroughly acquainted with the PSAS manual with special emphasis on the section on scoring in the Introduction (p. 5-14) and on all specific scoring information pertaining to individual testing categories. Once you have used the PSAS or sections of it for a short period of time and feel confident in your understanding of its procedures, complete the enclosed Pre-Speech Assessment of Alysia.

Carefully read through each section on pages 2-12 of the assessment form before doing any scoring. Then, as you have done before, start with page 5 and decide on appropriate PSAS Scores for each performance area. Once you have completely scored the assessment, transfer all scores to page 1, the Summary of Scores cover sheet. Total the scores for each category, placing these totals in the appropriate boxes. Also, establish PSAS Totals for all abnormal and normal scores and put those in the specified box in the lower left hand corner of the cover sheet. (See page 13 in your PSAS manual for an example of a completed Summary of Scores cover sheet.)

After placing all scores and totals on the Summary of Scores cover sheet, remove page 1 and send it to the address listed below with a completed information questionnaire (Yellow sheet). Keep pages 2-12 of the assessment so you can have a record of the scores that you gave to each performance area.

After we receive your Summary of Scores cover sheet (p.1) and your completed questionnaire, we will send you a copy of the entire Pre-Speech Assessment of Alysia with appropriate PSAS scores as established by its developer, Dr. Morris. You can then compare your scores with this completed assessment to better evaluate your use of the PSAS scoring procedures.

2. Information Questionnaire (Yellow form)

Please take a few minutes to complete all parts of the Information Questionnaire (Yellow form). This questionnaire will not only provide us with needed information on individuals, such as yourself, who are using the PSAS, but will also allow us to keep you up-to-date on any new information about the PSAS that may be of interest to you.

A completed Information Questionnaire must be included with the Summary of Scores cover sheet described in #1 in order for us to send to you a scored Pre-Speech Assessment of Alysia. Even if you do not wish to complete the procedures described in #1, we would appreciate receiving a completed questionnaire from you.

3. PSAS Training Workshops (Green form)

At this time, all individuals using the Pre-Speech Assessment Scale have been trained in its use through C.P. Project workshops or through Advanced Neuro-Developmental Treatment Speech Courses. The C.P. Project and the Curative Rehabilitation Center feel strongly about the usefulness of workshops in the Administration of the

-over-

Pre-Speech Assessment Scale. These workshops review all aspects of the PSAS manual while placing special emphasis on sharpening the observational and interpretation skills of each individual through the scoring of film segments for each performance area.

If you see the value in attending such a workshop, please complete the form on PSAS Training Workshops (Green form) and return it to the appropriate address listed below. You will be contacted as workshops are scheduled.

Send all completed forms to:

C.P. Project - PSAS
Curative Rehabilitation Center
9001 West Watertown Plank Road
Wauwatosa, WI 53226

# PRE-SPEECH ASSESSMENT SCALE

## PRE-SPEECH ASSESSMENT AND SUMMARY OF SCORES

Developed and Used with Permission of:
Suzanne Evans Morris, Ph.D.
202 Shepard Terrace
Madison, Wisconsin 53705

Name ALYSIA Birthdate _____ C.A. 5 yrs 4 mos

Address _____

Telephone _____ Parents' Names _____

Medical Diagnosis Mixed athetoid and spastic quadruplegia

Receptive Language Level _____

Expressive Language Level _____

Sensory Abilities/Disabilities _____

Examiner Suzanne Evans Morris Dates of Evaluation _____

### SUMMARY OF SCORES

I. FEEDING BEHAVIOR

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 1. Length of Time | 1 to 2 months | | |
| 2. Amount of Food | 1 to 7 months | | |
| 3. Types of Food | 1 to 18 months | | |
| 4. Position For Feeding | 1 to 18 months | | |
| TOTAL | | - | + |

II. SUCKING

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 5. Bottle or Breast | 1 to 12 months | | |
| 6. Cup | 6 to +24 months | | |
| 7. Spoon | 3 to +24 months | | |
| TOTAL: | | - | + |

III. SWALLOWING

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 8. Liquids | 1 to +24 months | | |
| 9. Semi-Solids | 3 to +24 months | | |
| 10. Solids | 6 to +24 months | | |
| 11. Coordination | 1 to 15 months | | |
| 12. Drooling | 1 to 24 months | | |
| TOTAL: | | - | + |

PSAS TOTALS

Abnormal (-) _____

Normal (+) _____

IV. BITING AND CHEWING

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 13. Jaw/Biting | 5 to 24 months | | |
| 14. Jaw/Chewing | 5 to +24 months | | |
| 15. Tongue/Chewing | 6 to +24 months | | |
| 16. Lips/Chewing | 6 to 24 months | | |
| TOTAL: | | - | + |

V. RESPIRATION-PHONATION

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 17. Initiation | 1 to +24 months | | |
| 18. Duration | 1 to +24 months | | |
| 19. Loudness | 1 to +24 months | | |
| 20. Pitch and Intonation | 1 to +24 months | | |
| 21. Voice Quality: Non-Speech | 1 to 15 months | | |
| 22. Voice Quality: Early Speech | 12 to +24 months | | |
| TOTAL: | | - | + |

VI. SOUND PLAY

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 23. Type | 1 to 18 months | | |
| 24. Jaw Movement | 1 to 18 months | | |
| 25. Tongue Movement | 1 to 18 months | | |
| 26. Lip Movement | 1 to 18 months | | |
| 27. Velopharyngeal Movement | 1 to 18 months | | |
| TOTAL: | | - | + |

## GENERAL POSTURAL TONE

### Basic Postural Tone at Rest:

Low tone which fluctuates to hypertonic.

### Influence of Position, Movement, and Stimulation on Postural Tone:

Most normal in sidelying. Worst in standing and in any sitting position where the hips are extended.

### Typical Patterns of Tone and Movement:

#### Head and Trunk:

Tendency toward asymmetry. Bilateral ATNR and STNR influences.

#### Arms and Shoulders:

Protraction of shoulders. Arms are variable from strong extension to strong flexion.

#### Hips and Legs:

Adduction and internal rotation...much knee flexion...hip hyperextension.

## HEAD AND TRUNK CONTROL

### Trunk Control:

Trunk control is best when flexion at shoulder girdle is controlled. Hip extension causes compensatory shoulder girdle flexion.

### Head Control:

Head control is very dependent upon trunk and shoulders. Poor separation of eye movement from head movement.

Alysia is able to regain control of the head once it is lost.

## ARM CONTROL AND SYMMETRY

### Arm Control:

Some weight-bearing...tendency to fist and support in a non-mobile fashion. Pointing with index finger produces pronation of arm and shoulder.

### Symmetry:

Keeps head in midline. Can turn from side to side but gets ATNR bilaterally.

## INFLUENCE OF ABNORMAL TONE AND MOVEMENT ON THE SPEECH MECHANISM

### Influence on the Oral-Motor System:

Jaw thrust and tongue retraction increase when she attempts to speak from a more unstabilized position.

### Influence on the Respiratory-Phonatory System:

Shoulder girdle tension and protraction reduces inspiratory capacity and increases laryngeal tension.

RESPONSE TO SENSORY STIMULATION

Response to Auditory Stimulation:

Normal

Response to Visual Stimulation:

Normal

Response to Vestibular Stimulation:

Tone is reduced with slow movement. Bouncing on the bottom builds up more normal back extension.

RESPONSE TO SENSORY STIMULATION

Response to Taste Stimulation:

Normal

Response to Smell Stimulation:

Normal

Response to Social and Emotional Stimulation:

Very excitable. Increases in abnormal oral patterns when she becomes very involved emotionally.

RESPONSE TO SENSORY STIMULATION

Response to Tactile Stimulation:

On the Body:

Normal response to handling.

On the Face and Lips:

Accepts touch to the face very well.

Within the Mouth:

No bite reflex, hyperactive gag, etc.

Ability to Provide Own Oral Stimulation:

Is able to do this only in side-lying.

STRUCTURAL DEVIATIONS OR DEFORMITIES

Deformities or Deviations of Oral Mechanism:

Deformities or Deviations of Respiratory-Phonatory Mechanism:

Deformities or Deviation of Other Body Parts:

Orthopedic Correction Through Bracing and Surgery:

## PHYSICAL USE OF HEAD, TRUNK, AND ARMS FOR COMMUNICATION

**Current Use or Attempted Use:**

Answers yes-no questions with head-shaking, pointing to pictures in the communication book, gestures.

**Limitations in Head Control:**

Has free turning and use of the head but its movement influences arm position and movement.

**Limitations in Trunk Control:**

Trunk is very unstable.

**Limitations in Arm and Hand Control:**

Flexor tone in shoulders limits arm control. Use of index finger for pointing increases pronation of arm and shoulder.

**Additional Observations and Comments:**

Associated reactions in non-pointing arm when using communication book.

## PHYSICAL USE OF THE FACE AND EYES FOR COMMUNICATION

**Current Use or Attempted Use:**

Much expression in her eyes and upper face.

**Limitations in Eye Control:**

Cannot separate eye from head movement in looking up, down, or to the side. This triggers the STNR and ATNR.

**Limitations in Facial Control:**

Some low tone in the cheeks.

**Limitations in Jaw and Lip Control:**

Strong tendency toward jaw thrust, tongue retraction, etc. with all movement or speech attempts.

**Additional Observations and Comments:**

## COMMUNICATION AT MEALTIMES

**Communicates Hunger:**

Uses speech or vocalization most of the time. Looks toward the kitchen, etc.

**Communicates Fullness:**

Shakes head. Keeps mouth closed.

**Communicates Food Preferences:**

Points to a specific food if present. Uses category pictures of different foods if food is not present.

**Child's Interaction with the Feeder:**

Eye contact, facial expression, etc. Communicative contact seems good.

**Feeder's Interaction with the Child:**

Mother's interaction seemed appropriate.

**Additional Observations and Comments:**

## USE OF AUGMENTATIVE COMMUNICATION SYSTEMS

**Needs for a Supplemental Non-Vocal System:**

Currently has a communication book with approx. 1500 words and pictures...very slow and responses limited to single words. Would be a candidate for an advanced communication aid such as the Auto-Comm in the future. May do better with an encoding system.

**Cognitive and Linguistic Abilities:**

Cognitive and linguistic abilities appear to be within normal limits according to standardized tests and school performance.

**Physical Ability to Indicate:**

Is able to indicate through hand-pointing. However, this causes loss of shoulder stability and triggers many associated reactions throughout the body. Head control is better than arm-shoulder control...might do better with an optical head pointer.

**Additional Observations and Comments:**

#1. LENGTH OF TIME REQUIRED TO EAT A MEAL

Largest Meal:

Dinner.

Who Usually Feeds:

Mother.

Position Usually Used:

Sitting in her Mulholland chair.

Special Equipment Used:

None

Length of Time for Largest Meal:

20-30 minutes.

Amount of Playing or Waiting During the Meal:

Behavioral Problems:

Some impatience if things aren't fast enough and she's hungry.

Additional Observations and Comments

PSAS Scores: (-)_____; (+)_____

#2. AMOUNT OF FOOD EATEN AT A MEAL

Largest Meal:

Dinner.

Amount of Liquid:

10 to 12 ounces.

Amount of Semi-Solids or Solid Food:

4 ounces.

Variability in Amount Eaten:

Fairly consistent.

Recent Changes in Amount:

None

Behavioral Problems:

Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

#3. TYPES OF FOOD EATEN BY MOUTH

Tube Feeding:

Thickening or Thinning Liquids or Semi-Solids:

None

Liquids:

Milk, fruit punch, water.

Pureed Food:

Yogurt, ice cream.

Ground or Jr. Foods, Lumpy Table Foods:

Coarsely Chopped Fruits and Vegetables:

All kinds.

Meat:

Hamburger, hot dogs, swiss steak, pot roast, bacon, pork chops.

Additional Observations:

PSAS Scores: (-)_____; (+)_____

#4. POSITION IN WHICH THE CHILD IS FED

Abnormal Patterns of Tone and Movement in Feeding:

Tendency toward arm flexion and shoulder girdle protraction. Occurs very strongly if she is frustrated.

Adaptations in Positioning and Handling:

Mulholland chair needs abduction wedge, head support, etc.

Effectiveness of Adaptations in Reducing Problem in Oral Area and Throughout the Body:

Generally effective. Some overflow of movement into the legs.

Position(s) Used:

Sitting in an adapted chair with 90° angle.

Amount of External Support Required:

Requires much support. Little or no head or trunk control when eating.

Additional Observations:

PSAS Scores: (-)_____; (+)_____

#5. SUCKING: LIQUIDS FROM THE BOTTLE OR BREAST

Initiation, Strength and Efficiency:

Jaw Activity:

Lip Activity:

Tongue Activity:

Control of Liquid Loss:

Additional Observations and Comments:

No longer takes the bottle.

PSAS Scores: (-)_____; (+)_____

#6. SUCKING: LIQUIDS FROM THE CUP

Jaw Activity:

Initiates sucking with a strong up-down motion, but can begin with quiet approach if jaw control is used by the feeder. Has no jaw stabilization on her own. Slight tendency toward a jaw thrust...occurs occasionally.

Lip Activity:

Dependent upon jaw. Able to close lips only when jaw is stabilized.

Tongue Activity:

Uses an up-down suck mixed with suckle. Tongue is cupped.

Additional Observations and Comments:

PT is having her use a straw with back tongue placement. This increases jaw movement and a suckle pattern.

PSAS Scores: (-)_____; (+)_____

#8. SWALLOWING: LIQUIDS

Observation of: bottle/breast____ cup x__

Head Position:

Upright.

Specific Swallowing Difficulties:

None

Jaw Activity:

Jaw is elevated but slightly unstable.

Tongue Activity:

Uses a mixture of simple protrusion and an elevated position.

Lip Activity:

Open or semi-closed.

Control of Liquid Loss:

Much liquid loss.

Coughing or Choking:

None usually.

Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

#11. COORDINATION OF SUCK, SWALLOW, BREATHING

Observation of: bottle/breast_____ cup x____

Respiratory Distress or Incoordination:

None

Suck-Swallow Sequencing:

Rapid sequencing of 3-7 sucks. Occasionally is able to take more than 1 ounce, but generally does better with less liquid.

Coughing or Choking:

Some observed.

Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

#7. SUCKING: PUREED FOODS FROM THE SPOON

Jaw Activity:
Wide jaw opening but minimal tendency to thrust. Some random up-down movement. No stabilizing with presentation of the spoon.

Lip and Cheek Activity:
Upper lip will come down if given enough time... very inconsistent...emerging.

Gum and Teeth Activity:
No bite reflex. Lower lip draws in for some cleaning...just beginning.

Tongue Activity:
Tends toward a tongue thrust at the beginning. Uses cupping of the tongue and a mixture of suckle and suck. Has separation of tongue and jaw.

Additional Observations and Comments:
Loses much food and saliva.

Abnormal oral patterns occur approx. 50% or slightly less than this.

PSAS Scores: (-)_____; (+)_____

#9. SWALLOWING: SEMI-SOLIDS

Food Used for Observation:
Pudding.
Head Position:
Upright or forward.
Specific Swallowing Difficulties:
None

Jaw Activity:
Jaw is elevated.

Tongue Activity:
Simple protrusion is primary pattern. Elevated position is beginning...seen 1x. Tongue thrust occurred approx. 25% of time.
Lip Activity:
Open.

Control of Food and Saliva Loss:
Much loss.

Coughing, Choking, Gagging:
None

Additional Observations and Comments:
Patterns are worse if she is fed rapidly.

PSAS Scores: (-)_____; (+)_____

#10. SWALLOWING: SOLIDS

Food Used For Observation:
Toast, cheese.
Head Position:
Upright
Specific Swallowing Difficulties:
None

Jaw Activity:
Elevated

Tongue Activity:
Simple protrusion. Elevated tongue pattern is be-beginning (seen 3-4x). Some extension-retraction.
Lip Activity:
Open or semi-closed.

Control of Food and Saliva Loss:
Loses saliva but not food. Loss is inconsistent.

Coughing, Choking, Gagging:
More with firm solids. Some with toast with small pieces. Still occurs less than 25%.
Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

#12. CONTROL OF DROOLING

Swallowing Movements Observed:
Frequently.

Control in Supine:
No drooling.

Control in Prone:
Slight amount...inconsistent...depends on activity level...more when active.
Control in Sitting:
Some drooling. Worse when doing something.

Control in Gross Motor Movement Sequences:
(i.e., rolling, creeping, cruising, walking)
Drooling.

Control in Fine Motor Activities:
(feeding, dressing, drawing, etc.)
Drools when pointing to communication book.

Control During Speech:
Drooling.

Additional Observations and Comments:
Much drooling when salivation is increased at mealtimes. Much drooling when eating.

PSAS Scores: (-)_____; (+)_____

#13. JAW MOVEMENT IN BITING

Food Used for Observation:
Toast, cheese.

Abnormal Movement Patterns:
No thrusting. Slightly abnormal shifting motions.

Control of Jaw Opening and Closing:
Uses either a rapid opening or quick closure... not fully a thrust (??).

Biting Pattern Observed on Soft Cookie:
Not well controlled. Rapid somewhat reflexive bite through. Some accidental break-off.

Biting Pattern Observed on Hard Cookie or Pretzel:
Phasic bite and release but with exaggerated jaw movement.

Overflow or Associated Movements:
Strong associated reactions in the legs.

Separation of Head and Jaw Movements:
Not tested.

Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

#14. JAW MOVEMENT IN CHEWING

Food Used for Observation:
Toast, cheese.

Abnormal Movement Patterns:
None

Stereotyped Phasic Chewing:
None

Non-Stereotyped Vertical Chewing:
Primary pattern.

Diagonal-Rotary Movements:
Occurs with tongue movement to both sides.

Circular-Rotary Movements:
None observed.

Additional Observations and Comments:
Very slight exaggeration of up-down movement when food is more difficult...contributes to the slowness of handling the food.

PSAS Scores: (-)_____; (+)_____

#15. TONGUE MOVEMENT IN CHEWING

Food Used for Observation:
Toast, cheese.

Abnormal Movement Patterns:
None

Extension-Retraction Pattern:
Mixed with chewing.

Munching Pattern:
Primary pattern.

Tongue Lateralization:
Lateralizes to both sides.

Food Transfer From Center to Sides:
Transfers to both sides...prefers left.

Food Transfer From Side to Side Across Midline:
Not observed. Mother says it occurs, but is not a smooth movement.

Speed and Precision:
Very slow. Difficult to observe.

Additional Observations and Comments:
Uses jaw a great deal to assist the tongue.

PSAS Scores: (-)_____; (+)_____

#16. LIP MOVEMENT IN CHEWING

Food Used for Observation:
Toast, cheese.

Abnormal Movement Patterns:
None

Drawing in of Lips and Cheeks:
Slight pull-in on both sides as food is there.

Movement of Upper Lip:
Active lip movement in down and forward direction.

Use of Gums or Incisors for Cleaning:
Just beginning.

Chewing with Lips Closed:
None

Control of Food and Saliva Loss:
Food and saliva are lost. Primarily saliva.

Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

## SUMMARY OF JAW MOVEMENTS DURING FEEDING

Abnormal Patterns:

Jaw shows instability and tends toward exaggerated downward movement without a clear-cut jaw thrust.

Jaw Stability:

Very unstable.

Movement Control:

Movement is not well-controlled. Major problem. Much seems to happen more accidentally or reflexively.

Grading of Movement:

Little or none.

Additional Observations and Comments:

Jaw patterns are better in feeding than they are in phonation or non-speaking interactions.

## SUMMARY OF TONGUE MOVEMENTS DURING FEEDING

Abnormal Patterns:

Mild tendency toward tongue thrusting with the spoon. None observed with liquids or solids.

Elevated Tongue Tip:

This is emerging but not yet well-established.

Movement Control:

Some control in transferring food from center to the side, etc. Skill and precision with the tongue is not good, however.

Separation of Tongue from Jaw:

Beginning to separate jaw from tongue in the emergence of an elevated tongue position. Uses jaw to assist food transfers with tongue.

Additional Observations and Comments:

## SUMMARY OF LIP MOVEMENTS DURING FEEDING

Abnormal Patterns:

None

Lip Closure:

Has not established full closure patterns in any feeding situation. Lips are very dependent upon the jaw.

Movement Control:

Beginning to get some downward and forward movement with the spoon and in chewing. Limited by jaw.

Separation of Lips From Jaw:

Little or no separation. Lips are hindered in development by jaw tendancy toward exaggerated extension.

Additional Observations and Comments:

## RESPIRATORY PATTERNS

Tonus of Musculature:

Low tone.

Depth:

Slightly shallow.

Rate:

Not timed but appears slightly rapid.

Type and Area of Movement:

Primarily abdominal...slight tendency toward reverse breathing pattern.

Regularity:

Irregular.

Additional Observations and Comments:

#17. EASE OF INITIATION OF PHONATION

Manner of Initiating Phonation For:

Crying, Laughing, and Squealing:

Easy crying, squealing and laughter.

Vowels and CV or VC Syllables:

Easy sound play with vowels and CV.

CVCV Sequences:

Only 1 CVCV heard...easy initiation. CVCV occurs rarely in her sound play.

Single Words:

Laryngeal blocs or hard glottal attack with jaw thrust occurs between 50-75% of the time.

Phrases and Sentences:

None heard.

Additional Observations and Comments:

Much struggle behavior and jaw movement without sound before the vocalization begins. Blocs consistently cut off phonation at the end. There are no voiceless consonants. Consistent substitution of voiced for /p, /k, /t.

PSAS Scores: (-)_____; (+)_____

#18. DURATION OF PHONATION

Bodily Tension and Movement:

Flexor tonicity with most speech. Easy crying and vowel and CV play without stiffness. Tense only with speech.

Laryngeal Tension:

Laryngeal tension with jaw thrusting. Strangled speech probably related to tongue retraction.

Duration and Adequacy of Sustained Phonation:

Crying:

Duration of 2-7 seconds. Well-sustained till end of burst.

Vowels and CV or VC Syllables:

1-1 1/2 seconds for vowels. Less than 1 second for CV and VCV.

CVCV Sequences:

Not heard.

Single Words:

Generally less than 1 second. Will occasionally get 1 second when voice is easy.

Phrases and Sentences:

None heard.

Additional Observations and Comments:

Longest duration is in laughter and squealing for non-crying phonation...Duration of 3-4 seconds consistently.

PSAS Scores: (-)_____; (+)_____

#19. LOUDNESS OF PHONATION

Bodily Tension and Movement:

Tense in shoulders consistently when loud. Low volume when more relaxed...i.e. 50% of the time.

Laryngeal Tension:

Strong

Adequacy and Variability of Loudness:

Crying:

Good loudness and variability with no bodily tension.

Vowels and CV or VC Syllables:

Low volume 50% of time. Adequate volume 50% of time. Tension in body when loud.

CVCV Sequences:

Not typically produced.

Single Words:

Loses loudness when voice is less strangled... Also associated with high pitch as she is softer.

Phrases and Sentences:

None heard.

Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

#20. PITCH AND INTONATION PATTERNS

Pitch and Intonation Patterns In:

Crying:

Variable patterns. Uses rise-fall melody as primary pattern. Normal pitch.

Vowels and CV or VC Syllables:

Rise-fall for vowels. Falling melody for CV. Normal pitch.

CVCV Sequences:

None heard.

Single Words:

Very stereotyped...either a flat pattern or falling. Pitch is high approx. 50% of time...especially when voice is less tense.

Phrases or Sentences:

None heard.

Variability of Intonation and Pitch:

Limited for speech.

Appropriateness to Context (Questions, Greetings, Declaratives, Interjections):

Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

#21. VOICE QUALITY DURING NON-SPEECH PHONATION

Voice Quality in Crying:

Variable. Some is very tense and strangled. Much is clear and loud with good quality...probably 50%.

Voice Quality in Vowels:

Slight tension but not as strangled as in speech phonation. OK about 25-50% of the time.

Voice Quality in CV or VC Syllables:

CV syllables are consistently tense.

Voice Quality in CVCV Combinations:

Occur rarely.

Consistency or Variability of Voice Quality:

Additional Observations and Comments:

Appears to be laryngeal tension associated with tongue retraction.

PSAS Scores: (-)_____; (+)_____

#22. VOICE QUALITY DURING EARLY SPEECH

Voice Quality in Single Words:

with Vowels:

Tense and strangled approx. 75% of time or more. Word "yeah" is OK about 10-25% of the time.

with Voiced Consonants:

Tense and strangled nearly 100% of time.

with Voiceless Consonants:

No voiceless consonants are produced.

Voice Quality with Phrases and Sentences:

Consistency or Variability of Voice Quality:

Some nice easy vocal productions are possible. Usually associated with handling to reduce tension.

Additional Observations and Comments:

Sometimes starts out clearly; then becomes strangled in quality as she loses jaw and tongue control.

PSAS Scores: (-)_____; (+)_____

#23. TYPE OF SOUND PLAY

Presence and Use of Sound Play:

Alone, Self-Stimulation and Play:

Much vocalization when alone.

With Toys or Pictures:

Frequent sound play and jargon with pictures as mother is reading to her.

With People:

Can play with sounds, but usually tries to use words.

To Initiate Communicative Contact:

Usually uses words or communication book.

To Respond to Communicative Contact:

Usually uses words or communication book.

#23. TYPE OF SOUND PLAY

Frequency and Examples of Production of:

Vegetative Pleasure Sounds:

Squealing, laughter.

Vowels:

Moderate amount when excited or trying to talk.

CV or VC Syllables:

/ɔja/, /ədɪ/, /əbi/.

Reduplicated CVCV Combinations ($C_1V_1C_1V_1$):

/wɔwɔ/ ...just emerging.

Variegated CVCV Combinations ($C_1V_1C_2V_2$), ($C_1V_1C_2V_1$), etc.:

None

Jargon-like use of CV and CVCV Syllables:

Single Words:

Many attempts: mom, daddy, pea, chair, yeah, no, etc.

Additional Observations and Comments:

Speech is very limited in sound types as is non-speech sound play. Not limited in frequency.

PSAS Scores: (-)_____; (+)_____

#24. JAW MOVEMENT DURING PHONATION

Abnormal Movement Patterns:

Mixture of jaw thrust and a continuous open-close pattern. Occurs more than 75% of time.

Ability to Sustain a Position for V or C:

Jaw movement goes to full-open with poor grading of movement.

Vowels and Vowel Sequences in Sound Play:

/ɔ/, /ə/, /ɪ/, /ʊ/, /ɑ/, /ɑɪ/, /æ/, /o/.

Vowels in Words:

/ɔ/, /ə/, /ɪ/, /ʊ/ /o/, /æ/.

Grading and Timing of Movement of VC or CVCV Transitions:

Poor where observed. Doesn't really move from one to other except in VCV patterns.

Additional Observations and Comments:

Produces the vowels but always goes to the exaggerated open mouth position after the vowel is produced, or after the position target has been briefly hit.

PSAS Scores: (-)_____; (+)_____

#25. TONGUE MOVEMENT DURING PHONATION

Abnormal Movement Patterns:

Strong retraction associated with jaw thrust...Affects V and CV productions 25-50% of the time.

Speed and Precision of Movement and Control:

Slow and with variable precision.

Type of Tongue Movement:

In Vowels:

Spreading and humping.

In CV, VC and CVCV Syllables:

Elevated tip in /d/ and /n/.

In Words:

Elevated tip in /d/ and /n/.

Separation of Tongue and Jaw:

No separation during speech but seen in feeding.

Additional Observations and Comments:

Tongue retraction seen following the good tongue position and is secondary to a jaw problem. Occurs on the final vowel of a CV syllable. Vowels still show tongue movement even in the retracted position.

PSAS Scores: (-)_____; (+)_____

#26. LIP MOVEMENT DURING PHONATION

Abnormal Movement Patterns:

Slight tendancy to lip retraction...approx. 25-50%... ceases once phonation begins.

Timing, Pressure and Precision of Movement and Contact:

Slow! Adequate pressure for /b/ most of the time.

Type of Lip Movement:

In Vowels:

Rounding, spreading.

In Consonants:

Bilabial contact and release.

In CVCV Syllables:

None

In Words:

Rounding, spreading, bilabial contact and release.

Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

#27. VELOPHARYNGEAL MOVEMENT DURING PHONATION

Abnormal Velopharyngeal Function:

May be slightly poor closure as reflected in constant voicing of voiceless consonants.

Control and Timing of Velopharyngeal Closure and Opening:

Voicing of voiceless consonants.

Nasal vs. Oral Resonance for Vowels:

Oral resonance for vowels.

Nasal and Oral Consonants:

In CV or VC Syllables:

Both oral and nasal consonants. /m/-/b/, /n/-/d/.

In CVCV Combinations:

No CVCV but has inadequate duration to do so. Jaw problems.

In Words:

Oral and nasal consonants /m/-/b/, /n/-/d/.

Additional Observations and Comments:

PSAS Scores: (-)_____; (+)_____

PRE-SPEECH ASSESSMENT SCALE
INFORMATION QUESTIONNAIRE

GENERAL

1. User's Name: _____

2. Preferred Mailing Address: _____
Street Address
_____
City State Zip

3. Place of Employment: _____
Agency Name
_____
Street Address
_____
_____
City State Zip

4. Professional Discipline (Check appropriate answer.)
Speech_____ OT _____ Nurse _____
PT _____ Teacher_____ Physician _____
Other (specify)_____

5. Who purchased the PSAS manual? (Check appropriate answer.)
Personal copy_____ Agency_____ Other (specify)_____

EDUCATIONAL

1. College/University Degree(s):

| Degree | Year | College/University |
|---|---|---|
| Degree | Year | College/University |
| Degree | Year | College/University |

2. a) Have you successfully completed a Basic 8-week course in Neuro-Developmental Treatment?_____ (If no, go on to #3. If yes, go on to #2b.)
b) Give the names of the coordinator-instructor and speech instructor, dates of the course, and location of the course:

| Coordinator Instructor | Speech Instructor | Location | Dates |
|---|---|---|---|

c) If you have attended any advanced N.D.T. courses, please specify:

| Course Title | Instructor(s) | Dates |
|---|---|---|
| Course Title | Instructor(s) | Dates |

-OVER-

3. If you have attended continuing education courses directly related to the areas of pre-speech and feeding, neuro-developmental treatment, normal/abnormal oral-motor and respiratory/phonatory development, or other topics related to the assessment/treatment of the child with neuromuscular involvement, please specify below:

| Course Title | Instructor/Lecturer | Dates |
|---|---|---|
| Course Title | Instructor/Lecturer | Dates |
| Course Title | Instructor/Lecturer | Dates |

PROFESSIONAL

1. Job Title: _____

2. Primary Employment Responsibilities: (Please check most appropriate answers.)
   Both Evaluation/Treatment: _____ Supervision: _____
   Evaluation only: _____ College/University Teaching: _____
   Administration: _____ Other (specify): _____
   Research: _____ _____

3. Ages of Primary Caseload Population: (Please check all appropriate answers.)
   Newborn: _____ 4-6 yrs.: _____ 10-12 yrs.: _____
   Birth-3 yrs.: _____ 7-9 yrs.: _____ 13-18 yrs.: _____
   Adults (19 yrs. and up) _____

4. How many hours per week do you spend in direct treatment? _____ evaluation? _____

5. Agency Type: (Please check one.)
   Hospital: _____ University: _____
   Rehabilitation Center: _____ Other (specify): _____
   Public School: _____

6. What evaluation tools are you using in addition to the PSAS?

   _____

7. Have you received any training in the use of the Pre-Speech Assessment Scale? ____
   If yes, please specify where or from whom you received this training. (Please check.)
   C.P. Project Workshop _____
   Advanced N.D.T. Workshop _____
   Individual training in the PSAS _____
   Other (specify) _____

8. Any additional comments concerning the PSAS:

## Pre-Speech Assessment Scale

## Training Workshops

Please complete this form if you are interested in attending a workshop on the Administration of the Pre-Speech Assessment Scale. These workshops are generally 4 days in length and are held Monday through Thursday.

1. NAME: _____

2. PREFERRED MAILING ADDRESS: _____

_____

_____

City State Zip

3. PROFESSIONAL DISCIPLINE: _____

4. Would you be able to attend a workshop if it is held at the Curative Rehabilitation Center in Wauwatosa, Wisconsin? _____ (yes or no)

5. If you answered no to question #4, would you be able to attend a workshop if: (yes or no)
   It is held in your general geographic region? _____
   It is held in your state? _____

6. Are there any specific times of the year when you definitely could not attend a workshop? _____ (yes or no)
   If yes, specify which months: _____

7. If it seems appropriate to schedule a workshop in your region or state, could the workshop be held at your agency? _____ (yes or no)
   If yes, give the name and address of your agency and the name and phone number of an appropriate contact person.

_____
Agency Name

_____
Agency Address

_____
City State Zip

_____ ( )
Contact Person Phone Number

Please return this completed form to:

C.P. Project - PSAS
Curative Rehabilitation Center
9001 West Watertown Plank Road
Wauwatosa, WI 53226

## PREFACE

### The Development of a Pre-Speech Assessment Scale

#### The Need

In 1971 the Demmer-Kiwanis Division of the Curative Rehabilitation Center (formerly called the Curative Workshop of Milwaukee) faced headlong the issue of accountability. Monies had been accepted from the federal government for program development and treatment of children in a pre-speech and language program. The onset of the "Comprehensive Training Program for Infant and Young Cerebral Palsied Children" (C.P. Project) represented a landmark in programming for the agency, and in its formal commitment to developing a means of measuring gains related to treatment. The requirement that pre-test and post-test measures be used and reported for all demonstration programs funded by the Bureau of Education for the Handicapped was a difficult one to meet. One-third to one-half of the total program dealt with pre-speech programming for the child under the age of 3 years. There were no existing tools for measuring the behaviors which were being assessed and treated. Thus began the development of the Pre-Speech Assessment Scale.

Although standardized measures of articulation and other speech production guidelines are in existence for the older child who has developed some speech, none are capable of measuring the prerequisite behaviors of the infant and young pre-school child. Since 1971, other individuals and agencies have informally attempted to develop a series of observation guidelines and tests primarily for the measurement of feeding development. However, none of these have been rigorously subjected to measures of clinical validity and reliability, nor have they had substantial input from a large group of clinicians formally trained to use the measure. Thus, we still face the same basic dilemmas encountered in 1971:

1. Educationally and clinically we have entered the "Age of Accountability" for funding and program development and maintenance. This has been underlined by the passage of the Federal Right to Education Bill for the Handicapped (P.L. 94-142) which not only mandates the right to appropriate education and treatment for all handicapped children, but states that they must be tested using standardized tests and measures for all areas of their educational (and therapy) programming. There are still no standardized measures of feeding or other areas of pre-speech functioning which are available to therapists and clinicians needing to meet these standards.

2. As pre-speech and feeding programs expand and the validity of treating infants with feeding problems becomes more widely accepted, there is a crucial need for tools for screening and appropriately identifying babies who are in need of treatment. At the present time, there are none.

3. As more children with feeding and other pre-speech disorders are seen for evaluation and treatment, the need for developing predictive measures of later speech development, for describing characteristics of different populations, and for measuring the effectiveness of specific treatment procedures becomes more critical. This requires the use of clinical measurement tools which meet criteria of validity and reliability. Most research to date on speech and pre-speech functioning within the neurologically impaired population has been limited to older children and adults because of the prerequisite that the individual be able to cooperate with the demands of more formal research equipment and procedures. In those instances where evaluation has been done on infants or younger children, only a tiny area of functioning (such as respiration or sucking and swallowing from a bottle) has been measured. A total picture of overall functioning has been lacking. Much of the research reported in the literature and occurring in today's laboratories provides interesting and useful information on normal and abnormal function. However, it is not fully applicable to the clinician because it relies on the use of equipment and procedures not readily available to the majority of programs working with the developmentally disabled child.

## History of Development of the Pre-Speech Assessment Scale

It has been against this background of need that Suzanne Evans Morris, Ph.D., special speech consultant to the C.P. Project of the Curative Rehabilitation Center, was given the task of developing such a tool. Funding for the development of the Pre-Speech Assessment Scale was provided by the Handicapped Children's Early Education Program, Bureau of Education for the Handicapped (changed to "Special Education Services" in 1982), Title VI, P.L. 91-230, in a grant to the C.P. Project.

The PSAS has completed 10 years of active development. The following has occurred during that time:

1. Categories appropriate to both a neurologically impaired population and a population of normally developing infants had to be defined and described in relationship to pre-speech development. Issues of clinical validity and a format appropriate to acceptable research and statistical measurement were considered.

   The PSAS has undergone seven revisions in its 10 years of development. Clinical input from therapists involved in field-testing and consultation from experts in the fields of statistics and speech production has been utilized.

2. Since the PSAS is based on a contrastive model of abnormal versus normal behaviors, a careful description of early infant development in the areas under observation needed to be compiled. Information from the existing literature and from widespread clinical experience was utilized in the development of PSAS categories and age ranges. However, existing published information proved inadequate for the diagnostic definition of normal versus abnormal function. Appropriate age ranges for acquisition of many pre-speech skills were unavailable.

   During the 3-year period of 1975 to 1978, six normal infants were studied longitudinally. They were filmed monthly from birth to 12 months, at 3 month intervals between 12 and 24 months, and again at 36 months. A detailed analysis of these longitudinal films provided substantial normative data for the PSAS.

3. A wide variety of clinical feedback on children in different types of settings with different types of problems was needed. In addition, feedback on the clinical and functional use, appropriateness, and ease of usage was required from clinicians with different backgrounds and needs. The measure needed to be capable of describing the children for whom it was designed. It needed to be easily administered by clinicians trained in its use.

   This required systematic and careful training of therapists who would use the PSAS and a procedure for collecting and utilizing information from their experiences with subsequent revisions. A 4-day training course on the use of the PSAS has evolved over the past 8 years. It currently includes a filmed experience in the observation of the pre-speech behaviors of normal infants and the observation, discussion, and scoring of pre-speech behaviors from films of neurologically impaired children. A training manual has been developed to standardize course content and teaching procedures.

   A total of 215 therapists has been trained between 1973 and 1981. Of this group, 161 were speech pathologists associated with replication centers of the C.P. Project and 54 were speech pathologists, physical therapists and occupational therapists who had completed an 8-week course in Neuro-Developmental Treatment. Therapists in the latter group were trained in the use of the PSAS between 1978 and 1981.

   These therapists provided yearly feedback on their clinical use of the PSAS. Scored assessments on approximately 800 different children have been submitted. Information from these assessments and from feedback questionnaires and questions raised and problems encountered by therapists have been incorporated into revisions of the PSAS. Ongoing feedback continues to be provided by 123 therapists.

4. Since the PSAS was expected to meet criteria for clinical reliability, measures for assessing reliability were required.

   Three formal studies of inter-examiner reliability were completed between 1975 and 1979. A total of 75 therapists participated in the studies. Each therapist was required to score 78 filmed samples of behavior; 3 in each of the different behavioral categories of the PSAS. These were then scored for agreement with a pre-determined standard of correctness. A system of percentage-of-agreement was initially used. Percentages-of-agreement for different catagories, ranging from 65% to 87% agreement, provided initial indications that therapists could be taught to observe and score relevant behaviors in a reliable manner. It also revealed weaknesses or inconsistencies in the filmed samples, and in specific areas or items

on the PSAS itself. A major revision of the PSAS was completed in 1980. Changes in reliability procedures and in methods for deriving and interpreting reliability were made in late 1981.

The revised procedures for intra-examiner reliability have been used in a study involving 101 therapists who received the 1980 edition of the PSAS. For this study, participants were sent written descriptive assessments of two children. They were asked to score them using the PSAS and then to return their scored assessments. One month later they were sent and asked to score the same two assessments, without reference to their original scoring decisions. The final phase of this study involves the scoring of reliability films by a group of therapists who met the criteria for inter-examiner and intra-examiner reliability for scoring procedures. This phase of the study will provide a measure of the ability to make accurate observations and interpretations of given behaviors, as well as the ability to make appropriate scoring decisions. Because this study is currently in progress, reliability data is not yet available.

## Use of the 1982 Revised Edition of the Pre-Speech Assessment Scale

The initial development and use of the Pre-Speech Assessment Scale was limited to therapists with relatively homogeneous backgrounds. All had a minimum of six days preliminary training and experience in the assessment and treatment of pre-speech disorders. All had subsequently been trained in the use of the PSAS in a 3 or 4-day workshop. The current edition of the PSAS will be available to therapists with widely divergent backgrounds and expertise in assessing pre-speech abilities and disorders. Therefore, participation in training workshops to develop observational skills and scoring proficiency with the PSAS is recommended to therapists who wish to become skilled in its use.

Increased proficiency can be developed by the individual therapist prior to participating in a training workshop by following some general guidelines. Initially, the PSAS should be used as a guide to the systematic observation of normal and abnormal behaviors. No attempt should be made to record these observations. The therapist should select a performance area in the PSAS, such as Sucking liquids from the cup. The testing procedures and behavioral descriptions in the manual should be studied. The behaviors listed for the performance area should be observed for several days in children seen for overall evaluation or therapy. If possible, normal infants should also be observed. As cup drinking is observed in a child, the therapist should re-read the behavioral descriptions and decide which descriptions fit the child's cup drinking behavior. After this type of observation has been completed for all performance areas, the PSAS manual should be re-read to obtain information pertinent to scoring. Additional observations should then be recorded and scoring decisions for each performance area should be made. Experience has shown that the greatest learning is derived from a systematic and observational approach to scoring. Observations for scoring should be made on many infants and children for each category of the PSAS. For example, chewing might be observed and scored during one study week or period. Phonation might be the focus for another. Following systematic observation, study and scoring, the PSAS may be used to evaluate the full range of pre-speech behaviors for a single child. It is not recommended that individual children be fully evaluated and scored without careful, systematic study of each category of the PSAS.

## Future Development of the Pre-Speech Assessment Scale

The 1982 edition of the Pre-Speech Assessment Scale is considered an experimental edition. Additional research is needed before the PSAS can meet rigorous standards for reliability, validity, and accuracy of standardization. To meet these standards, the following measures must first be taken. It is hoped that they can be accomplished within a 5-year period of time.

1. Fully standardize the PSAS by means of cross-sectional testing of approximately 200 normal infants. This would supplement and support the current age-related norms which have been derived from the longitudinal study of six normal infants.

2. Complete the statistical analysis of the internal consistency reliability, inter-examiner reliability, intra-examiner reliability, and test-retest reliability.

3. Explore the clinical validity of the PSAS as a predictor of later speech development by means of a longitudinal pilot study of 20 handicapped infants under the age of 1 year. These infants would be scored at regular intervals on the PSAS and their communication development would be evaluated with standardized speech and language tests at the ages of 3 and 4 years.

4. Develop a series of training models for the purpose of identifying the most efficient means of training therapists to become reliable users of the PSAS. Variables such as the length and type of training would be explored.

5. Continuation of feedback on the clinical use of the PSAS to be provided annually by interested users of the PSAS.

ACKNOWLEDGEMENTS

I would like to extend my gratitude to the more than 100 therapists who through C.P. Project or advanced Neuro-Developmental Treatment speech workshop participation have assisted in the planning, experimental, and writing stages of the development of the Pre-Speech Assessment Scale. Many thanks must go to the parents and children whose cooperation in evaluation and filming sessions provided the information from which the PSAS was created. I am particularly grateful to the Curative Rehabilitation Center for the support it has provided throughout the past eleven years and to Rona Alexander, Ph.D. and Kathryn Ptacek for their continued guidance, patience, and assistance in the development and editing of this book.

# INTRODUCTION

## Concepts Underlying the Pre-Speech Assessment Scale

### Categories

The Pre-Speech Assessment Scale (PSAS) was developed to provide a way of evaluating pre-speech development in neurologically impaired children. It is based on the presumption that the early development of feeding patterns, of respiratory and phonatory patterns, and of the movements acquired in early sound play provide the foundation for the more complex act of speech production. An elaboration of the possible relationships between these pre-speech production skills is provided at the beginning of each section. Therefore, careful observations in these areas constitute the basic portion of the PSAS.

The PSAS examines twenty-seven different pre-speech performance areas divided into six major categories. These categories and their performance areas are as follows:

I. Feeding Behavior
   1. Length of time
   2. Amount of food
   3. Types of food
   4. Position for feeding

II. Sucking
   5. Liquids from bottle or breast
   6. Liquids from the cup
   7. Pureed foods from a spoon

III. Swallowing
   8. Liquids
   9. Semi-solids
   10. Solids
   11. Coordination of sucking, swallowing and breathing
   12. Control of drooling

IV. Biting and Chewing
   13. Jaw movement in biting
   14. Jaw movement in chewing
   15. Tongue movement in chewing
   16. Lip movement in chewing

V. Respiration-Phonation
   17. Ease of initiation of phonation
   18. Duration of phonation
   19. Loudness of phonation
   20. Pitch and intonation patterns
   21. Voice quality during non-speech phonation
   22. Voice quality during early speech phonation

VI. Sound Play
   23. Type of sound play
   24. Jaw movement during phonation
   25. Tongue movement during phonation
   26. Lip movement during phonation
   27. Velopharyngeal movement during phonation

## Pre-Speech Behaviors of the Neurologically Impaired Child

Both gross motor and pre-speech behaviors of the infant and child with neurological problems can be divided into three different types of movement patterns:

1. Abnormal or pathological movement patterns. Abnormal or pathological movement patterns are those which are never seen in the normally developing infant. They represent the release of abnormal tonic reflex patterns due to damage to the central nervous system. These patterns are usually associated with abnormalities in postural tone or the abnormal movement patterns in the affected portions of the body. The child is generally floppy (hypotonic), or stiff (hypertonic) at rest or as movements are attempted. The abnormal movement patterns themselves are generally stereotyped in nature, and are elicited with a high degree of consistency. Their presence directly interferes with normal development and prevents the child from developing the pre-speech movement patterns of the tongue, lips, jaw, pharynx, larynx, and respiratory system from which speech movements develop. In the oral mechanism they are represented by patterns such as the jaw thrust, tongue thrust, tonic bite reflex, tongue retraction, lip retraction, jaw clenching, and failures to coordinate the entire system for efficient sucking and swallowing.

2. Normal primitive movement patterns. Normal primitive movement patterns are those which occur normally at early stages of baby development. Generally, these are the patterns of movement observed during the first 4 to 6 months. In the normal infant, these early movement patterns gradually diminish until they finally are replaced by other more advanced movement patterns. Neurologically impaired and retarded children may retain these patterns. It is not unusual to see a pattern which would have been normal at 3 to 4 months still present in a child of 3 to 4 years or in an adult. It is necessary for these primitive patterns to diminish or disappear in order for more advanced movement patterns to emerge. Therefore, when normal primitive movements are retained beyond the appropriate age, they too interfere with the development of higher level movements necessary for efficient speech production.

3. Higher developmental movement patterns. Higher developmental movement patterns are those which occur at later stages of infant development, are further refined in the first 2 to 3 years of life, and then become selected for the direct production of speech sounds. These patterns are also seen in the neurologically impaired child. They may fall anywhere on the continuum of normal development between 6 and 24 months. By 24 months the child has developed most of the basic movements and refinements of oral movement which will be necessary for intelligible speech production. Some changes, particularly in refinement of control for direct speech production, will continue to occur well past the age of 2 years.

   Neurologically impaired children who have acquired some of these higher developmental movement patterns may show patterns which are appropriate for their chronological age level. Others may show the more advanced patterns but still be delayed in terms of chronological age. For example, a 6-month-old baby may be chewing and biting appropriately at the 6-month level of pre-speech development; or a child showing a 6-month level of chewing and biting development may chronologically be 3 years old.

## Abnormal and Normal Development Components of the Pre-Speech Assessment Scale

The PSAS incorporates a double scaling system which takes into account the abnormal-normal contrast for pre-speech development. Scoring in each of the performance areas is done by measuring the child against specific behavioral descriptions in the abnormal and normal developmental sections of the scale.

Scoring in the abnormal behavior area is basically an ordinal type of scaling in which negative scores of -1 through -9 are given a child depending upon the clinical judgement of degree of abnormality. Scores of -9 to -7 represent the most severe deviations from the normal. Scores of -6 to -4 represent moderate degrees of abnormality. Scores of -3 to -1 represent the more mild deviations.

Scoring in the normal developmental ranges of the scale is on an equal-interval scale with scores of 1 to +24 representing the monthly age intervals of 1 to +24 months. The specific score signifies the end point of a month-long period of development. Thus, a score of 1 would represent behaviors acquired by the child between birth and 1 month. A score of 4 would represent behaviors acquired between 3 months and 4 months, etc.

It must be emphasized that these scores and developmental ranges are only approximate, since most of the areas under observation have never been subjected to wide-scale developmental analysis. Where possible, they are based upon three different sources of information: (1) developmental information available in the research and clinical literature; (2) from a filmed longitudinal study of six normal infants conducted by the author of the PSAS; (3) from extensive clinical observations of approximately 800 infants and young children with cerebral palsy and other neurological handicaps who were in early treatment programs. Closer approximations will occur in future PSAS changes. Although monthly scores have been given in the normal developmental range, it would be safer and more appropriate to describe a child's development in a specific performance area as being "in the 6 to 12-month range" rather than saying that he or she is at the "8-month level" of development.

Although the PSAS is applicable to charting the pre-speech development of the normal infant, it was specifically designed to describe the behaviors of the abnormal or slowly developing infant. Because most children with cerebral palsy or identified pre-speech disorders have not reached the 2-year level of speech production, the PSAS can be used with older children. Any child functioning below the 2-year level in pre-speech development can be appropriately tested.

It is important to remember that it is impossible for a scale of this type to pick up all of the qualitative differences in movement patterns which would differentiate the normally developing youngster from the abnormally developing child. The range of skill and function in the normally developing child and the exact influence of mild deviations from the normal is still unknown. Therefore, although a cerebral palsied child exhibits a pre-speech behavior which can be placed at the 6 to 12-month range of development, performance may still be somewhat different qualitatively from that of a normal infant at that age. If the deviation is mild but obvious to the examiner, the differences from normal may be indicated by a double scoring of an abnormal score of -1 and an appropriate score in the normal developmental range.

### Measurement of Capabilities for Function

The evaluation concept is one of measuring the child's capabilities for function and not primarily his or her deficits. Except where stated in the testing protocols, it is assumed that the behavior which is recorded or measured will represent the child's best abilities in that area. For this reason, it is important that the examiner obtain information on the best ways to position and handle the child for obtaining the best performance. The PSAS is primarily designed to enable the clinician to quantify the gains in pre-speech areas which occur as the result of maturation and/or treatment.

The basic underlying concept is that assessment and treatment are totally interrelated. A given behavior is assessed for the purpose of determining treatment needs and priorities. The child's responses to treatment are evaluated in order to determine the appropriateness of the treatment program. Because of this assumption, the child's behavior may be scored during a formal evaluation session or in the course of several treatment sessions. It is assumed that the scores given to a child for a given category will take into account the variability of performance which the child shows within a week's period of time. Thus, information may be gathered from tapes of babbling recorded by the parents at home, or from observations of questionable behaviors on two or more assessment-treatment periods falling within the same week.

Although the evaluation may be completed and scored in a single session for some children, it is more typically geared toward completion in two or more sessions. This reduces the fatigue factor of the young child and also allows the examiner to re-check any questionable areas or obtain information which was not gathered in the previous session. The purpose of the PSAS in its present form is to assist the therapist with the planning and evaluation of treatment or to ascertain progress which a child may have made in an interval in which no formal therapy was given.

## Evaluation Procedures

### Appropriate Use of the PSAS

The PSAS is not intended to be a substitute for a good narrative evaluation of the child's pre-speech and language functioning. It is impossible for a number and graph system to capture the subtleties of function and dysfunction that fully describe a child. Moreover, areas of postural tone and movement, head and trunk control, response to sensory stimulation, and response to specific techniques of inhibition and facilitation of movement are of critical importance. Because of difficulties in quantifying and adequately describing these areas, they are included only in the narrative portion of the evaluation form and are not scored on the PSAS.

The PSAS was designed to provide an in-depth view or profile of a child's pre-speech abilities. Clinical experience has indicated that the full pre-speech evaluation requires a time allottment of approximately 2-1/2 to 3 hours per child. An additional 30 minutes is usually needed to score and graph the child. Time requirements for the evaluation, however, vary substantially with the age and degree of physical involvement of the child, the amount of cooperation which the child is able to give, and the examiner's familiarity with the child and the PSAS.

It is clear, however, that the PSAS is not appropriate to use as a rapid screening measure in those clinical or school situations where the examiner has less than 2 hours of total contact with the child (even when the evaluation may be spread over several days of child contact). If the evaluation session must be relatively brief, it would be preferable for the examiner to obtain a strong overview of the child using the general observations in major categories of the PSAS. If some type of long term follow-up is planned for the child, the examiner might focus on five or six scoring areas which best delineate the child's problems. These areas could be given more in-depth observation and scoring, and they would provide a base-line set of measures for repeated observations over several years of follow-up. It is not recommended that the examiner attempt to obtain precise information and score the child in all categories in a brief time period.

## Evaluation Packet

The evaluation packet is made up of six basic components: (1) Pre-Speech Assessment Letter and Questionnaire for Parents; (2) Guiding Questions for the Pre-Speech Assessment; (3) Pre-Speech Assessment and Summary of Scores; (4) Summary of Scores for Repeated Evaluations; (5) Pre-Speech Graph; (6) Pre-Speech Assessment Scale. A description of each component of the evaluation packet follows:

1. Pre-Speech Assessment Letter and Questionnaire for Parents (Appendices A and B). The Pre-Speech Assessment Letter and Questionnaire for Parents were developed to allow the parents of the child enough time to observe and think about the kinds of information they would be asked to provide. The questionnaire contains much of the information needed for the feeding behavior and sound play sections of the PSAS. The letter and questionnaire are generally sent to parents of the child approximately two weeks prior to the evaluation. The parents are asked to complete the questionnaire and return it to the examiner either ahead of time or at the time of the evaluation. Information included in the questionnaire can then be scanned or read prior to the evaluation. Additional information can be gathered at that time. Use of the questionnaire can free the examiner from having to do a great deal of writing of basic factual information at the time of the parent interview. The questionnaire may be inappropriate in instances where difficulties with bilingualism or literacy exist in the family.

2. Guiding Questions for the Pre-Speech Assessment (Appendix D). This listing of guiding questions provides an organized set of observations which may be made by the examiner in gaining a full and integrated view of the child's pre-speech skills. The questions were designed to elicit all information needed for scoring the child on the PSAS. In addition, guiding questions are provided to elicit information on the child's physical and sensory ability and his or her use of general communication skills.

   It is recommended that therapists refer to these questions while they are learning to use the PSAS. Therapists may find it unnecessary to refer to them once they develop a familiarity with the questions and the observational format.

3. Pre-Speech Assessment and Summary of Scores (Appendix E). The Pre-Speech Assessment and Summary of Scores form provides a concise means of noting function and dysfunction in each area of the evaluation and an opportunity for immediate scoring of those behaviors measured by the PSAS. The information boxes provide space for recording information on the child's overall physical and sensory function and his or her use of physical and cognitive skills for communication. It is important to know and understand the difficulties that the child may have with overall postural tone and movement patterns, with the ability to use head and trunk control, and with responses to various types of sensory stimulation. Problems in these areas can directly influence the child's use of the oral mechanism and the respiratory-phonatory system. It is also important to gain an awareness of the child's interaction with others in a communicative environment. If the child is using abnormal patterns of movement to communicate or has no desire to communicate or interact with others, this will affect the treatment strategies which are derived from the PSAS. The information related to the child's physical, sensory and communicative functioning is critical to obtain even though it is not formally scored on the PSAS.

The examiner should incorporate information from these overall sections of the evaluation as more specific information is gathered on the pre-speech areas. This may be done by appropriately handling or positioning the child for feeding, and by exploring, through handling, the effect of some treatment on the pre-speech abilities which the child shows. This information should be noted within the "Additional Information and Comments" section of each information box. It is important that observation of both unaided and assisted pre-speech behaviors be included even though scoring on the PSAS will be only of unaided performance.

> Information used for scoring the child on the PSAS must come only from the child's or child and parent's unaided performance. The examiner should use positioning and stimulation appropriately for the child. However, specialized techniques such as jaw control, initial reduction of oral hypersensitivity through oral-digital stimulation, movement to facilitate easier phonation, etc., should not be used during or prior to the evaluation for scoring.

The information boxes are sequenced in the general order in which behavioral functions are scored on the PSAS. However, in the feeding section the organization occurs by food types. It has been easier for an observer to have the information boxes for sucking and swallowing liquids or soft foods adjacent to each other rather than located on separate pages for sucking and swallowing. This has provided a rapid means of recording observations of the child's performance as it is occurring. Since there are no leading questions to guide the observations, the examiner should have a basic familiarity with the issues and distinctions which are important for accurate scoring on the PSAS. Initial guidance may be provided by simultaneous use of the section containing Guiding Questions for the Pre-Speech Assessment.

The face sheet contains boxes for recording both abnormal and normal scores for each of the performance areas and total scores for each of the six categories. The final page provides a summary of the child's basic problems and treatment recommendations based on the assessment.

4. Summary of Scores for Repeated Evaluations (Appendix G). The Summary of Scores for Repeated Evaluations form provides a means for the examiner to systematically observe changes in scores which occur for each performance area and category over a period of time. Scores from four different evaluations can be recorded on the form for comparison.

5. Pre-Speech Graph (Appendix F). The Pre-Speech Graph was designed to provide a visual referent for comparing the child's problems and levels within each performance area and for comparing developmental trends across categories. It was also designed as an important means of noting progress or lack of progress from one evaluation period to the next.

6. Pre-Speech Assessment Scale (pages 55-133). The Pre-Speech Assessment Scale consists of 27 different performance areas felt to influence the later development of speech. Testing procedures and specific scoring information for evaluating each area are provided in the scoring manual. The examiner should become thoroughly familiar with the items which are included and the progression from abnormal through the levels of normal development for each item. This will assist in making notations on the Pre-Speech Assessment and Summary of Scores form which can be utilized in scoring.

## Scoring the PSAS

### Scoring Procedure

After observing the child's behavior for each item and recording the observations, the examiner should rate the performance and assign a score or set of scores which describes the current condition or abilities. Scoring should be completed each day for those items with complete observations rather than waiting for completion of the entire evaluation. Those areas which are still questionable should not be scored prior to an additional observation period.

### Categories of Scoring

Three general types of scores could be given to a child: (1) abnormal behavior score (-); (2) normal developmental range score (+); (3) no behavior score (0, X, or ?). An explanation of each follows:

1. Abnormal behavior score (-). An abnormal behavior score is used to describe the presence of patterns of tone and movement in the pre-speech areas which are not observed in the normally developing infant or child. Abnormal scores of -1 to -9 are given if the child shows any of the described behaviors in the behavioral descriptions. The severity of the abnormality is based primarily on the potential interference with speech production and the frequency with which the behavior occurs.

2. Normal developmental range score (+). A normal developmental range score is used to describe the presence of movements or characteristics in the pre-speech areas which are observed in the normally developing child between the ages of 1 and 24 months. Several of the performance areas contain the provision for scoring a child at a +24-month level to indicate that there is an important final step in the pre-speech sequence which occurs between 24 and 36 months. Scores in the normal developmental range contain the implication that the child who receives a score at a higher level can also meet the criteria for each of the lower level items. For this reason, the higher scores should not be assigned if there are developmental gaps at lower levels of development. In these instances the child would receive the lower score which represents an unbroken continuity of development. For example, in the area of Sucking: Pureed foods from the spoon (page 73), a minimum score of 6 would be given to the child who uses the upper gums or upper incisors to clean the lower lip during sucking from a spoon (15-month level), and keeps the tongue quiet in anticipation of feeding (6-month level), but does not yet demonstrate downward and forward movements of the upper lips (8-month level). In this situation, a clinical judgement score, as described on pages 9 -11, might be given to indicate the presence of emerging behaviors at a higher level.

The presence of co-existing abnormal behaviors would not prevent the child from receiving an appropriate normal developmental range score which described a portion of the behavior. The use of a double scoring procedure, for situations such as this, is explained on pages 8-9.

3. No scoreable behavior (0, X, or ?). Three different scores could be given to the child who shows no scoreable behavior in the performance area: 0, X, or ?. These scores indicate that the behavior is not present due to chronological age, for non-neurological reasons, or due to the examiner's failure to obtain an adequate sample of behavior which does exist.

a. Score of 0. A score of 0 would be given if the child is chronologically below the age when the behavior should first emerge. Such a score would indicate that the child would not logically be expected to show scoreable behavior in this area. For example, one would not expect a 3-month-old infant to show chewing behavior. Because of the chronological age and lack of expectations the child should be given a 0 for Jaw movement in chewing, Tongue movement in chewing, and Lip movement in chewing, (pages 95-99). A 1-month-old infant would be given a 0 for Voice quality during early speech phonation (page 117). A score of 0 indicates to the examiner that the lack of behavior is appropriate to the child's chronological age.

The child's chronological age may be adjusted for the first 2 years if the baby was premature. In this instance, the child's chronological age should be reduced by the number of weeks or months of prematurity. Thus, a 7-month-old infant who was 8 weeks premature (i.e., gestational age of 32 weeks) would be compared with a full-term infant of 5 months. In this case, a score of 0 for Tongue movement in chewing would be given to the child even though scoring begins at 6 months. Adjustments for prematurity should not be made if the child is chronologically older than 24 months. Adjustments are not to be made for the overall delayed development seen in the retarded child. Thus, no adjustments would be made for a 26-month-old child who was 3 months premature. A 26-month-old child functioning cognitively and motorically at the 6-month level of development would still be compared with children of 26 months.

b. Score of X. A score of X would be given if the child shows no measurable behavior but is chronologically above the age when that behavior should first emerge, and if the absence of the behavior is not related to the primary neurological pre-speech disorder. Reasons for assigning this score are listed for each performance area within the behavioral description for the score of X. A score of X indicates to the examiner that the lack of behavior is not due to the child's chronological age nor to the interference of a primary neurological disorder affecting the specific area being assessed.

The examiner must make a clinical determination of the probable reason for the lack of behavior. If, upon testing, the behavior does not exist and abnormal or interfering behaviors are seen, then the child would not receive an X score, but would be given the appropriate abnormal behavior score (usually a -9). If the behavior does not appear and the parents agree that this is typical at home, then an X score would be given if the probable reason for its absence was a medical or behavioral reason not related to a primary abnormality in the area being evaluated.

For example, a 12-month-old child with no chewing behavior and no abnormal movement patterns of the tongue would receive a score of X for Tongue movement in chewing. A score of 0 would not be given since the emergent point for this behavior is 6 months. A score of -9 would not be given since abnormal tongue movements were not the primary reason for the lack of chewing. The lack of tongue movement could conceivably be due to abnormal functioning of the jaw. In this case the child would still receive an X score in the tongue movement category; a -9 might be given in the category for Jaw movement in chewing.

A 4-year-old with no speech due to low cognitive and linguistic functioning would receive an X for Voice quality during early speech phonation since the lack of speech is not related to a disorder of respiration-phonation. A score of 0 would not be given since the emergent point is 12 months. A score of X would also be given if the lack of speech production was due to severe impairment of the articulators. It is important to remember that the X score implies that lack of measurable behavior is not a problem of motor control in the specific area being measured. If the lack of measurable behavior in the above example were due to difficulty with obtaining phonation, the problem would be directly related to the voice quality category and an abnormal score would be given instead of an X.

No adjustments in the child's chronological age are to be made for prematurity after 24 months. No adjustments to a "developmental age" are to be given for known degrees of mental retardation. Therefore, a score of X instead of a 0 would be given for all children above the age of 24 months who were missing behaviors unrelated to the primary neurological pre-speech disorder.

c. Score of ?. A temporary score of ? would be given if the child shows no measurable behavior at the time of the examination due to lack of cooperation or to the examiner's decision not to observe and score the behavior. It is a score which indicates that the behavior is probably present in a scoreable form, but that inadequate information was provided by the child, therapist, or parent for appropriate scoring.

It is important to obtain parental input on the appropriateness of the task demanded of the child. For example, in the area of Swallowing: Solids (page 83), a child might cry and refuse to open the mouth during an attempt to introduce solid foods. If the parents state that solids are eaten at home and feel that the child just isn't hungry, a ? would be given. If the parents state that they have never been able to give the child solids and that similar crying behavior occurs at home, the ? would not be appropriate. At this point, the examiner would have to explore the possibility of rejection due to severe oral hypersensitivity. If such a problem appears to exist, the failure to swallow solids would be scored as a -9. If, however, no overt physical reason appeared to interfere with the acceptance and swallowing of solids, an X would be given if the child were chronologically above the age of 6 months. If the child is below the age of 6 months a 0 would be given for the lack of behavior.

In some instances the examiner will decide to administer only a portion of the PSAS. For example, as part of a feeding clinic program only the sections relating to oral development may be administered. Scores of ? should be routinely given to all other areas to indicate that information was not gathered or scored in these areas.

After an evaluation on a child has been completed and there are no plans for the child to return, the examiner may find informational gaps which make scoring of any type impossible. For example, no information has been gathered on Jaw movement in biting (page 93). A ? would be given to indicate that it is impossible to give even a minimal score. The ? should not be given if the informational gap is one differentiating two scores. For example, the child has been observed biting foods of different thickness and hardness. A score at the 21-month level is achieved. However, the examiner notes that no information has been obtained on the child's ability to bite while keeping the head in midline when food is presented on both sides (24-month level). Because of the failure to test and obtain this information, the child cannot be considered for scoring at the 24-month level. A score of 21 months would be given with notes in the narrative section of the evaluation that biting on the sides with head in midline was not tested.

The ? score should never be given because the therapist does not know how to score the child. It is not a measure of therapist indecision or uncertainty. It is a statement of lack of adequate behavior to measure or a choice not to score the particular category.

It is important that a blank square on the Summary of Scores sheet or a blank area on the graph indicate the real absence of measurable behavior. The ? score should be used routinely to indicate a lack of information. If the examiner were to leave blank areas where information had not been gathered, it would be interpreted as a lack of abnormal or interfering behaviors or the failure for normal behaviors to have emerged. Both of these interpretations could be false if the child is simply refusing to cooperate or the examiner has chosen not to observe and score the area.

Double Scoring

It has been recognized that the neurologically impaired child may show a mixture of abnormal, primitive, and chronologically normal behaviors. The co-existence of both abnormal and normal developmental range patterns within the same performance area is recognized by the Pre-Speech Assessment Scale.

Both abnormal and normal behaviors should be noted during the evaluation. Both will be scored on the PSAS. Abnormal or interfering behaviors should be evaluated by the behavioral descriptions of (-) scores which occur at the top of each page. Normal behaviors should be evaluated by the behavioral descriptions of (+) scores which follow the descriptions for the no behavior scores (0 or X).

For example, a 12-month-old infant is to be scored on Sucking: Liquids from the bottle or breast (page 69). Intermittent sucking difficulties are observed. Jaw thrusting and tongue thrusting interfere with the initiation of sucking the bottle. However, once sucking is initiated, the baby is able to continue the pattern in a rhythmic, strong, and well-sustained fashion. Liquid is lost extensively during drinking and when the tongue and jaw thrust are observed. Due to the initial interference by the jaw and tongue thrust, an abnormal score of -6b would be given. Because of the presence of suckling or sucking as an established pattern, the baby would also receive a normal score of 1 month.

Although double scoring is possible, it may not be appropriate in many instances. A single score may indicate either the presence of normal behaviors with no interfering abnormal behaviors or the lack of well-established normal behaviors in a child with strong abnormal patterns. If only a single score is given, the examiner should leave the other blank or square empty on the scoring sheets.

A score within the normal developmental range may not be given unless it occurs frequently enough to be considered a well-established behavior.

For example, a child showing a tongue thrust in the area Sucking: Pureed foods from the spoon (page 73) could receive a double score of -6b and 3 months if the sucking or suckling pattern of the tongue occurred at least 75% of the time. If the tongue thrust occurred only when the spoon was presented and a suckle response occurred once the food was in the mouth, this would be an appropriate scoring combination. The same double score could also be given if there was interference with active suckling

less than 25% of the time when the food was in the mouth, creating a situation where suckling was still a predominant pattern. If, on the other hand, the tongue thrust continued as a primary response or became intermingled with a non-suckling mouthing of the food as the primary pattern once food was in the mouth, then a double scoring would be inappropriate. In this instance the child would receive a single score of -8ab or -6ab and the squares and blanks in the normal behavior section would remain empty.

Consistency of Performance

Inconsistencies of performance represent a questionable area for scoring. A certain amount of inconsistency occurs naturally, in the normal human learning process. Most of the measurements on the Pre-Speech Assessment Scale do not lend themselves to the more standard way of taking a mean or median figure. The majority of items are clinical observations which cannot be easily quantified. Some of the items are described as having a behavior which occurs "more than 75% of the time" or "less than 50% of the time." For these items, the behavioral description itself takes inconsistencies into consideration.

If statements describing the amount of inconsistency allowed do not occur within the behavioral description, the following guidelines should be followed:

1. Negative behaviors will always be scored within the abnormal behavior range even if they are infrequent or inconsistently mingled with the emergence of higher level normal behaviors.

2. Normal behaviors must occur at least 75% of the time in order to be considered well-established and scored according to the behavioral description.

3. A clinical impression of "well-established behavior" may be given by the examiner in some instances where the probability of occurrence of the behavior in the normal child may be low. This latter situation would make the accurate computation of +75% a difficult one to agree upon.

4. A normal behavior which occurred less than 75% of the time would be considered an emerging behavior. Its presence would provide the opportunity for the use of a clinical judgement score, indicating the ongoing development of more mature behaviors.

For example, a 4-year-old child is beginning to use external jaw stabilization through biting down on the edge of the cup. Nearly 50% of the time the jaw moves up and down in an unstabilized pattern. The child could not be scored at an 18-month level for Sucking: Liquids from the cup (page 71) because the new behavior could not be considered well-established. However, the child's performance is better than that described at the 12-month level. A clinical judgement score of 15* would be appropriately given to indicate that the new behavior was emerging. The use of clinical judgement scoring is described in the following section.

Rotary jaw movement in chewing appears to be related to the frequency with which the child lateralizes the tongue or transfers food from side-to-side or across midline. The behavior, unlike spoon cleaning by the upper lip, would not be expected to occur in the normal child each time food was presented. Its presence is also highly determined by the type of food which the child is given to chew. Therefore, the determination of a 75% proficiency point would be extremely difficult to arrive at. In such instances, the examiner may act upon a clinical impression based on the ease with which the behavior does occur and its presence or absence in situations in which its likelihood is very high.

Clinical Judgement Scoring (*)

Because only a limited number of behavioral points can be included in any scale, there will be times when a child's performance is not exactly described by the scores listed in the Pre-Speech Assessment Scale. The child may meet some of the criteria for a higher level score but has not completely attained that level. The child may show emerging behaviors for all items at the higher level but has not yet established these behaviors at the 75% proficiency level. Gains may have been made in reducing the amount of abnormality in an area when compared with a previous evaluation, but all of the criteria for the next level may not have been met.

Clinical judgement scoring is utilized when a child's behavior in a performance area falls somewhere between two of the scores listed for that area. In situations like this, the examiner would use his or her own clinical judgement to assign a score that falls somewhere between the two listed scores.

Guidelines for use of a clinical judgement score are provided within each performance area under Specific Scoring Information. Some of the factors to consider when making a decision to assign this type of score are described in this section.

The following general guidelines for determining the appropriate clinical judgement score should be followed:

1) Clinical judgement scores in the abnormal behavior section are based upon frequency of occurrence and severity of interference. In most instances, the examiner has the choice of only one clinical judgement score between the two questionable scores.

2) Clinical judgement scores in the normal behavior section are based primarily upon the degree of skill and proficiency of the described behavior and upon the presence of emerging behaviors at a higher level.

3) There may be as few as a single scoring choice or as many as 12 scoring choices in the normal behavioral ranges. This makes selection of an appropriate score difficult.

4) If there is more than one scoring choice for a clinical judgement score, a well-thought-out procedure should be used in assigning a score. If the behavior is only slightly more advanced or mature than the lower behavior, a score 1 or 2 months above should be given. If the behavior very closely meets the criteria for the higher behavior, a score 1 or 2 months below that behavior should be given. Behaviors which are between these two extremes should be scored according to the full developmental level of the child. Because of the presence of more developmental information at 3 month age intervals, selection of arbitrary scores of 9, 12, 15, 28, or 21 months would be more appropriate than an arbitrary score of 8 or 11 months.

The identification of use of a clinical judgement score should be made on the score sheet by the placement of an asterisk (*) slightly above and to the right of the number (i.e., 5c*).

If the child is given a clinical judgement score which is related to a combined letter and number choice (i.e., -8a, or -6b) the associated letter should also be attached to the assigned clinical judgement score (i.e., -7a* or -5b*).

For example, in the performance area of Jaw movement in biting (page 93 ), -8b identifies a jaw thrust occurring more than 50% of the time; -6b identifies a jaw thrust occurring less than 50% of the time. If a clinical judgement score of -7 is given to the child, the reference letter (b) should be attached to the numbered score. Thus, the child's score would read: -7b*. This applies if more than one letter choice describes the lower level score as well. Thus, if the child also showed a tonic bite reflex, the clinical judgement score would be -7bc*.

The asterisk (*) should also be placed in the body of the recording form next to the more advanced behaviors which influenced the examiner to give a clinical judgement score.

Thus, in the previous example in which a -7bc* score was given for Jaw movement in biting, the asterisk would be placed in the body of the recording form next to the information: "jaw thrust and tonic bite reflexes occur approximately 50% of the time*". This would key the examiner or another observer into the specific information which was used in assigning the clinical judgement score. This is particularly important when comparing the child in a test-retest situation over a period of time.

Some examples of use of clinical judgement scores follow:

1. Jaw movement in chewing (page 95). A child shows an interfering jaw thrust approximately 50-60% of the time in chewing. This is close to the frequency levels listed for both the scores -8b and -6b. In this situation a clinical judgement score of -7b* could be given.

2. Jaw movement in chewing (page 95). A child shows a jaw thrust 75% of the time during chewing. This abnormal behavior is described by a score of -8b. However, the jaw thrust is relatively mild and does not interfere greatly with the chewing rhythm. A score of -7b* could be given to indicate a lesser abnormality. A -1 score could not be given in this instance due to the high frequency of occurrence of the behavior.

3. Coordination of sucking, swallowing and breathing (page 85). A child uses a combination of single-sips and sequences of three to four suck-swallows in drinking a cup of liquid. Coughing and choking occur frequently and the longer drinking sequences are beginning to occur only when the child is extremely thirsty. Less than 1 ounce of liquid is consumed in the longer drinking sequences. Since the child's score is only slightly better than the 9-month level, a score of 10* months would be appropriate.

4. Duration of phonation (page 109). A child shows an adequate duration of 1 to 2 seconds during phonation of single words. Two to three-word phrases are emerging but occur only occasionally in the child's speech. The general developmental tendency is for word combinations to emerge near the age of 24 months. Because of the low frequency of their occurence in this situation, a score of 21* months might be more appropriate.

Although the clinical judgement score is always available, it should not be used indiscriminately. If the description for a stated score fits the child, the score should be used. If the child's behavior is not described by the stated score, a clinical judgement score should be used.

## Mild Abnormalities or Qualitative Differences from Normal (-1 score)

In every performance area the -1 score refers to a relatively mild abnormality which probably does not interfere with the acquisition of movement in the pre-speech sequence. However, it may interfere and become a problem to the child attempting to use these movements for speech production.

For example, an extremely mild jaw thrust which did not interfere with cup drinking skills or which occurred only when the child was ill or under stress would not be significant in preventing the child from acquiring a full sequence of stability in controlled drinking. However, when dealing with precise timing, issues of co-articulation and communicative stress, such a mild abnormality could influence both the precision and speed of connected speech.

Because of the widespread differences in children and the difficulty in quantifying many qualitative deviations in performance, the abnormality observed may not be listed among the abnormal behavioral descriptions. In order to recognize the possible influence of these minor deviations on pre-speech or later speech development, a score of -1 would be given.

For example, a child may achieve an elevation of the front of the tongue in single words. However, the tongue is slightly thick and actual contact of the elevated portion is slightly behind the tip with a mid-blade elevation. Although these characteristics are not listed in the behavioral descriptions for Tongue movement during phonation (page 129)the child should receive a -1 score to indicate that there are mildly abnormal components to the movement.

Guidelines for assignment of a -1 score are provided within each performance area under Specific Scoring Information.

The -1 score is never used if the child has behaviors which could be scored at a more abnormal level (i.e., -2 to -9). It is reserved for the child who does not have major abnormalities in the performance area.

A -1 should be placed in parentheses (-1) in the body of the recording form next to the behaviors which influenced the examiner in the decision to give a -1 score.

Thus, the above example of Tongue movement during phonation might read: "tongue is slightly thick (-1) and contact of the elevated portion is slightly behind the tip with a mid-blade elevation (-1)." This would alert the examiner or another observer to the specific information used in giving the child a -1 score. This is particularly important when comparing the child in a test-retest situation over a period of time.

Recording of the Scores

Immediately following the evaluation, the examiner should compare the observations noted in the Pre-Speech Assessment and Summary of Scores form with the behavioral descriptions in the Pre-Speech Assessment Scale Manual to determine the appropriate score to be recorded.

If the child exhibits some abnormal behaviors, a minus score should be placed in the blank for abnormal or negative scores (i.e., (-) -8). If the child exhibits some well-established normal behaviors, a plus score should be placed in the blank for normal or positive scores (i.e., (+) 9 mos.). If the child does not receive a double score, one of the blanks should be left empty. If the child shows no scoreable behavior (0, X, ?), the appropriate symbol should be entered in both the abnormal and normal blanks (i.e., (-) X; (+) X).

If a behavioral description includes alternative behaviors within one scoring category, the letter of the alternate should be placed beside the number (i.e., (-) -4c). If the child's behavior can be described by more than one alternative, a single number and multiple letters should be recorded (i.e., (-) -4acd). Letters referring to an appropriate alternative should also be used if a clinical judgement score has been assigned to the child.

If a clinical judgement score has been assigned, an asterisk (*) should be placed slightly above and to the right of the number (i.e., (+) 5*).

All scores recorded in the body of the form should be transferred to the face sheet in the area designated "Summary of Scores."

If a child receives a score of +24 months, it would be recorded on the face sheet as 25.

Totals should be computed for each category and for the PSAS as a whole. To compute the totals for each category, add the scores for that category. Add the category totals to obtain the PSAS totals.

An example of the Summary of Scores section of the form may be seen in FIGURE 1. Examples of all of the scoring and recording procedures are included.

If the child is seen for repeated re-evaluations, a total of four different evaluations can be recorded on the Summary of Scores for Repeated Evaluations form. This form allows the examiner to compare changes in the child's performance in each performance area and category.

At this point in the development of the PSAS, the total scores computed for each category should not be compared. Severe limitations due to insufficient standardization of age norms, differences in number of performance areas within a category, and differences in the number of total points possible, make it impossible to make a direct interpretation of the numbers involved. For example, it is not possible to say that because a child received a higher positive score for swallowing than for sucking, his sucking skills are more advanced. In the future it may be possible to establish scoring norms for each category for children at different chronological age levels.

## SUMMARY OF SCORES

### I. FEEDING BEHAVIOR

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 1. Length of Time | 1 to 2 months | | 2 |
| 2. Amount of Food | 1 to 7 months | | 7 |
| 3. Types of Food | 1 to 18 months | | 18 |
| 4. Position For Feeding | 1 to 18 months | -6 | 7 |
| TOTAL: | | -6 | + 34 |

### II. SUCKING

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 5. Bottle or Breast | 1 to 12 months | | 12 |
| 6. Cup | 6 to +24 months | -3a | 6 |
| 7. Spoon | 3 to +24 months | -3a | 6 |
| TOTAL: | | -6 | + 24 |

### III. SWALLOWING

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 8. Liquids | 1 to +24 months | -6df | 6 |
| 9. Semi-Solids | 3 to +24 months | -6d | 6 |
| 10. Solids | 6 to +24 months | -6d | 6 |
| 11. Coordination | 1 to 15 months | -3a | 9 |
| 12. Drooling | 1 to 24 months | | 1b |
| TOTAL: | | - 21 | + 28 |

| PSAS TOTALS | |
|---|---|
| Abnormal (-) | 84 |
| Normal (+) | 146 |

### IV. BITING AND CHEWING

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 13. Jaw/Biting | 5 to 24 months | | 18 |
| 14. Jaw/Chewing | 5 to +24 months | | 9 |
| 15. Tongue/Chewing | 6 to +24 months | -1 | 10* |
| 16. Lips/Chewing | 6 to 24 months | -1 | 6 |
| TOTAL: | | - 2 | + 43 |

### V. RESPIRATION-PHONATION

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 17. Initiation | 1 to +24 months | | 3 |
| 18. Duration | 1 to +24 months | -7ab* | 1 |
| 19. Loudness | 1 to +24 months | -7ab* | 1 |
| 20. Pitch and Intonation | 1 to +24 months | -8b | 1 |
| 21. Voice Quality: Non-Speech | 1 to 15 months | -8 | |
| 22. Voice Quality: Early Speech | 12 to +24 months | -8 | |
| TOTAL: | | -38 | + 6 |

### VI. SOUND PLAY

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 23. Type | 1 to 18 months | -3 | 5 |
| 24. Jaw Movement | 1 to 18 months | | 1 |
| 25. Tongue Movement | 1 to 18 months | -4b | |
| 26. Lip Movement | 1 to 18 months | -4b | |
| 27. Velopharyngeal Movement | 1 to 18 months | | 5* |
| TOTAL: | | - 11 | + 11 |

FIGURE 1. Summary of Scores for a 3-year-old athetoid child, B.R.

Scores may be effectively compared within the same performance area or category. For example, it is possible to say that because a child's normal or positive score has increased from 25 to 48 in Sucking, measurable gains have been made for the category as a whole. In the same manner, if abnormal or negative scores have decreased from -20 to -5 for Sound Play, one can say that progress has been made.

The examiner is asked to obtain total scores in each category and for the PSAS as a whole in order to help establish a procedure which will eventually be used. Age norms for category scores and total scores should be available in the future. Procedures are currently being developed which may make it possible to directly compare scores in different categories. It should be emphasized, however, that at the present time the totals are meaningless, except when they are used for comparison of a single child's scores within the same performance area or category on two or more administrations of the PSAS.

## Frequency of Evaluation and Scoring

The length of time between evaluations will vary with the age, severity and progress of the child. It is recommended that evaluations and scoring should occur at 6-month intervals. Testing at 3-month intervals may be more appropriate for young infants whose progress may be more rapid and whose physical status is more changeable. Re-evaluation and scoring should also be done more frequently if the therapist feels that the child is on a plateau and is not making progress. Re-evaluation and scoring should also be done any time a child is discharged from treatment or enrolled in a new treatment program. In general, the frequency of the evaluation should be at the discretion of the therapist.

It should be understood, moreover, that all therapy should consist of mini-evaluations of the child's current status and his or her response to therapeutic procedures. The continual assessment of the child's responses provides the therapist with the appropriate current data for building and revising treatment programs. Re-evaluation and scoring with the PSAS should never become a substitute for an ongoing re-evaluation of the child's problems, abilities, and response to treatment. The more systematic evaluation format of the PSAS offers a means of objectively viewing the child's total pre-speech status and building or revising overall treatment goals and priorities.

## Graphing Procedures

The Pre-Speech Graph was designed to provide a referent for comparing the child's problems and levels within each performance area and for comparing developmental trends across categories. It was also designed as an important means of noting progress or lack of progress from one evaluation period to the next. A horizontal bar graph style was selected to provide this information.

The graph format is that of a double graph. The graph of abnormal behavior is on the left hand side of the page. The graph providing normal developmental range information is on the right hand side of the page. They are separated by a listing of the major categories and performance areas.

## Graphing the Initial Evaluation

> The shaded areas on the graph represent the boundaries of the developmental range for each item (see FIGURE 2.).

For example, the graph in FIGURE 2. shows that it would be possible to give a child scores which range from 3 months to +24 months for Swallowing: Semi-solids. Scoreable behaviors for this area are not described until the 3-month level. In a similar manner, the scoring of Swallowing: Solids can only occur between the 6 and +24-month level. Coordination of Sucking, swallowing and breathing has scores which begin at 1 month and reach their peak score at 15 months. Control of drooling begins at 1 month and reaches its peak at 24 months. Swallowing: Liquids has the full boundaries of the scale, ranging from 1 month to +24 months.

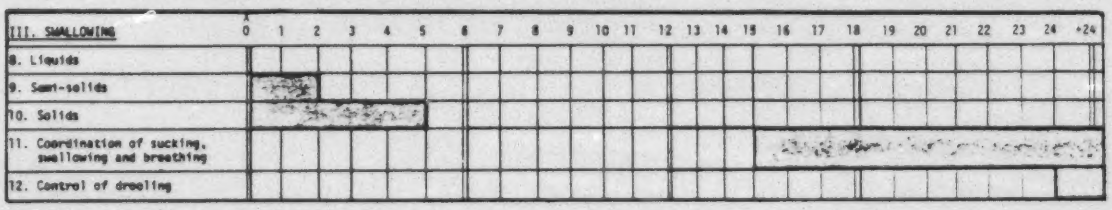

III. SWALLOWING
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 +24
8. Liquids
9. Semi-solids
10. Solids
11. Coordination of sucking, swallowing and breathing
12. Control of drooling

FIGURE 2. Shaded areas on the graph.

Scores taken from the Summary of Scores section are transferred to the graph by drawing a solid black bar which always begins at the left side of the abnormal section of the graph for the abnormal scores and always begins at the left side of the normal section of the graph for the normal scores. Therefore, for both graphs, more advanced behaviors are represented by longer lines which approach the right hand side of the graph.

In order that each bar stands out clearly, the width of the bar should be approximately half the width of the vertical space for each item. A black felt-tip pen should be used for this baseline reading on each graph (see FIGURE 3.).

FIGURE 3. shows a score of -2 in the abnormal area with its bar beginning at the far left side of the page, passing through the scores of -9, -8, -7, -6, -5, -4, and -3, and ending on the line which represents -2. A score of 6 in the normal range begins at the X-0 line which marks the beginning of the normal developmental range. The bar then passes through the numbers 1, 2, 3, 4, and 5 and ends on the line representing a score of 6.

FIGURE 3. also shows an example of there being no behavior to be graphed. The child is given a score of X, 0, or ?, and no bar is drawn. The score is indicated on the graph by placing a small X, 0, or ? on the X-0 line on both the normal and abnormal sides of the graph. The symbol is placed on both sides because it is not known whether the behavior will develop normally or abnormally as it emerges.

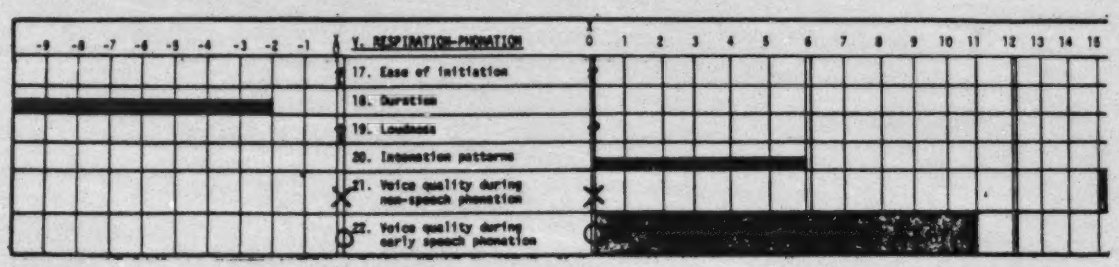

-9 -8 -7 -6 -5 -4 -3 -2 -1 X
V. RESPIRATION-PHONATION
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
17. Ease of initiation
18. Duration
19. Loudness
20. Intonation patterns
21. Voice quality during non-speech phonation
22. Voice quality during early speech phonation

FIGURE 3. Placement of graphing symbols.

When an area is shaded on the left hand side of the normal development graph, the horizontal bar passes through the shaded area until it reaches the appropriate score (see FIGURE 4.).

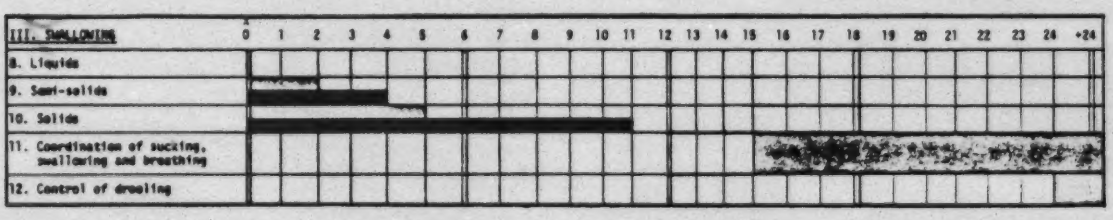

III. SWALLOWING
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 +24
8. Liquids
9. Semi-solids
10. Solids
11. Coordination of sucking, swallowing and breathing
12. Control of drooling

FIGURE 4. Graphing over shaded areas.

Lines drawn to graph the child's abnormal and/or normal scores must be kept within the scoring range boundries for each respective graph section (i.e., within -9 to X or 0 for abnormal behavior section, within X or 0 to +24 months for normal development section). This applies to both the baseline evaluation and all subsequent re-evaluations.

Symbols for the clinical judgement score (*) and for alternative behavior scores (a, b, c, etc.) are not indicated on the graph.

Color-Coding on the Graph

Felt-tipped pens of different colors should be used to draw the bars on the graph for each evaluation. Changes in behavior can be read more easily when they are indicated by color rather than by shading or design as was done in the black and white examples in this manual.

For purposes of consistency, the initial or baseline evaluation should be coded in black. The re-evaluation should be coded in red.

Although it is possible to graph more than two evaluations on the same form, this has proven to be confusing to the viewer. When a series of more than two evaluations are to be compared, a series of consecutive graphs should be prepared. If, for example, four separate evaluations are to be prepared, a series of four graphs could be prepared in the following manner: Graph 1- evaluations 1 and 2; Graph 2- evaluations 2 and 3; Graph 3- evaluations 3 and 4; Graph 4- evaluations 1 and 4.

Graphing Re-Evaluations

The procedure for graphing re-evaluations is essentially the same as for graphing the original evaluation. However, the beginning point of the bar is different and all scores are graphed in a color other than black. In FIGURE 5., shaded bars indicate scores for the re-evaluation.

If the child's abnormal or normal score improves in a performance area in which scoreable behaviors from a previous evaluation have been graphed, the bar for the re-evaluation score begins where the bar for the previous evaluation ends (see FIGURE 5., Jaw control in biting).

The procedure used for graphing improvement in a section of a performance area in which no score or a score of X, O, or ? was graphed on the previous evaluation is the same as that used for graphing the initial evaluation described on page 15 (see FIGURE 5., Jaw control in chewing, Lip movement in chewing, Voice quality during non-speech phonation).

If the child no longer shows behaviors within the abnormal range, a thin line is drawn which begins at the end of the bar from the previous evaluation and ends with an arrow pointing to the X-O line on the abnormal behavior graph (see FIGURE 5., Jaw control in chewing).

If the child has plateaued and made no measurable progress in either the abnormal or normal sections, a narrow wavy vertical line is made at the end of the bar from the previous evaluation (see FIGURE 5., Tongue movement in chewing and Ease of initiation).

If the child has regressed in a performance area, the regression would be indicated by a wavy vertical line which begins at the plateau point but continues to the left as a straight thin horizontal line above the bar from the previous evaluation. The regression line ends with an arrow pointing to the child's current score (see FIGURE 5., Loudness).

The procedure for graphing regressions which go from the normal development range into the abnormal behavior range is basically the same as that described in the previous paragraph. However, in this situation, the regression line would end with an arrow pointing to the X-O line on the normal development graph. The abnormal behavior would be graphed with a solid bar drawn from the far left of the abnormal section and extended to the right to the child's current score. If the child received a score in the abnormal behavior range on the previous evaluation, his or her current score would be graphed according to the procedures for improvement, plateauing, and regression described above. Graphing lines and bars would not be drawn across the boundries of the two graph sections (see FIGURE 5., Voice quality during non-speech phonation).

If the child continues to show an absence of the behavior, another X, O, or ? should be added to the X-O line on both sides of the graph (see FIGURE 5., Voice quality during early speech phonation).

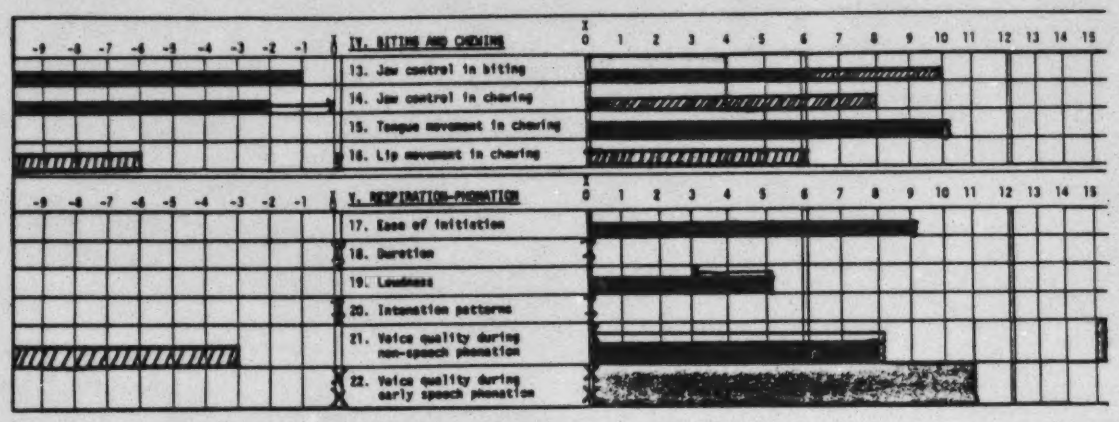

IV. BITING AND CHEWING
13. Jaw control in biting
14. Jaw control in chewing
15. Tongue movement in chewing
16. Lip movement in chewing
V. RESPIRATION-PHONATION
17. Ease of initiation
18. Duration
19. Loudness
20. Intonation patterns
21. Voice quality during non-speech phonation
22. Voice quality during early speech phonation

FIGURE 5. Graphing the re-evaluation.

As in the baseline graphing, symbols for the clinical judgement score (*) and for alternative behavior scores (a, b, c, etc.) are not indicated on the graph.

Uses and Interpretations of the Graphs

Graphs can give a very rapid overview of problem areas and the most important areas in need of treatment emphasis. In utilizing a graph effectively, the examiner-therapist should initially look at behaviors which are completely missing (those represented by an X) and try to determine whether the absence of these behaviors is seriously preventing the child from progressing in other areas. For example, if the child is 3 years old and has an X for Swallowing: Solids, this would indicate that solid foods are not given to the child. This will prevent or delay the emergence of any chewing skills and may also affect tongue movement during phonation. Thus, it might be important to include the introduction of solid foods as an important treatment goal.

Areas which are scored in the abnormal section would be another primary focus for treatment. This is particularly true when no co-existing normal behaviors exist. These are the behaviors which are preventing the emergence or development of normal pre-speech behaviors. The therapist should look for common problems in the areas and get a feeling for how many areas of development are being hindered by abnormal behaviors.

Finally, the general normal development range for the child in each of the six categories should be observed. It is important to note whether there is a large difference among these categories. For example, a child might show normal behaviors which all cluster between the 6 and 12-month levels. Another child might show more of a scatter, with some categories clustering between 6 and 12 months but others averaging between 18 and 24 months.

The graphs may be used quite effectively to make comparisons which can assist in making decisions for treatment needs and priorities. In addition to assisting with basic decisions of where to begin the treatment program, the following areas may be aided by comparing test-retest scores or scorings completed under different testing conditions:

1. Changes in status of normal and abnormal behaviors during a period of treatment.

2. Changes in status of normal and abnormal behaviors during a period of no treatment.

3. Changes in status of normal and abnormal behaviors in a comparison of aided and unaided performance (i.e., with use of special procedures for facilitation or inhibition).

4. Changes in status of normal and abnormal behaviors in a comparison of self-feeding and being-fed.

Improvements or regressions in pre-speech behaviors under the above condition comparisons could assist the therapist in making decisions for changing the emphasis of a treatment program, beginning or ending a treatment program, evaluating the effectiveness of special treatment techniques, and determining the appropriateness of a self-feeding program for a child.

## Case Histories

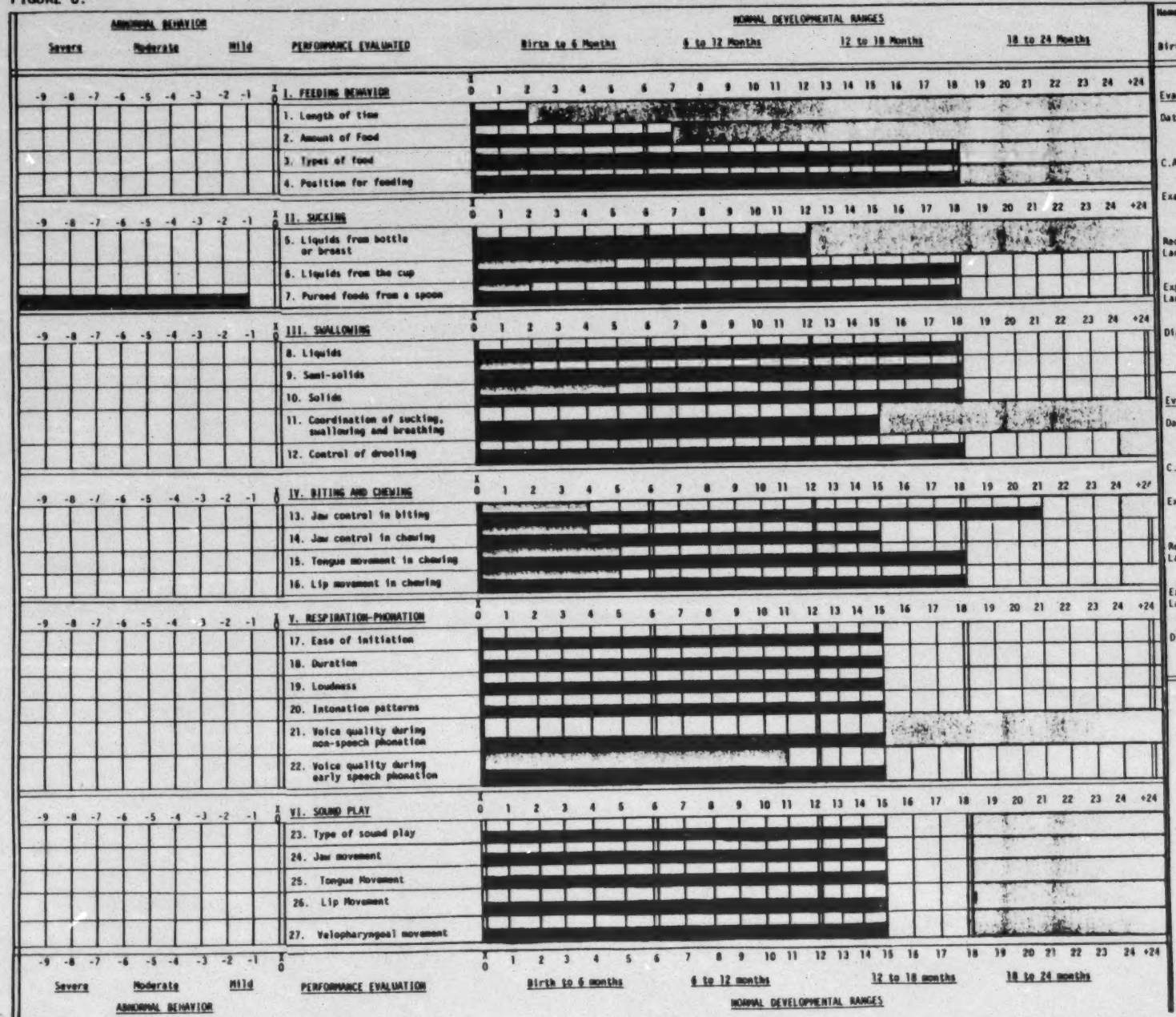
The following case histories and profiles illustrate the use of the graph profiles in making differential diagnoses, in deciding whether the child is a candidate for therapy, in identifying major problem areas, in determining the emphasis of a treatment program, and in evaluating the appropriateness of the treatment program.

Each example has been selected to illustrate specific issues which face the therapist in the decision-making process. FIGURES 6 through 8 illustrate the process of observing the general pattern of ability and disability and making treatment referrals and recommendations. FIGURES 9 through 12 illustrate the process of determining treatment priorities and assessing the effectiveness of the implemented treatment program. FIGURES 13 through 18 provide comparisons among an initial baseline evaluation and different types of program management. FIGURES 19 and 20 provide comparisons between self-feeding and being-fed profiles in order to evaluate the appropriateness of initiating a self-feeding program.

FIGURE 6.

## PRE-SPEECH ASSESSMENT SCALE

Suzanne Evans Morris, Ph.D.
January, 1982 Edition




Name: Jeff

Birthdate:

**Evaluation #1**

Dates:

C.A.: 19 months

Examiner:

Receptive Language Age: 14 months

Expressive Language Age: 14 months

Diagnosis:

**Evaluation #2**

Dates:

C.A.:

Examiner:

Receptive Language Age:

Expressive Language Age:

Diagnosis:

Note:

The shaded areas on the graph represent the boundaries of the developmental range for each item.

X, O, ? = no scoreable behavior.

FIGURE 6.

Child: Jeff

Age: 19 months

Diagnosis: Mild Neurological Signs

Receptive Language: 14 months

Expressive Language: 14 months

GENERAL PATTERN

1. Age appropriate behaviors are present in all feeding areas.
2. Very mild abnormal behaviors (mild tongue tremor and asymmetry) are observed while sucking pureed foods from a spoon.
3. Mild delays (of 4 months) in Respiration-Phonation and Sound Play categories are a function of a mild cognitive-linguistic delay (REEL scores of 14 months) and are not a reflection of reduced sensorimotor abilities.

RECOMMENDATIONS

1. Formal treatment was not recommended.
2. General suggestions were given to the parents for enhancing receptive and expressive language development.

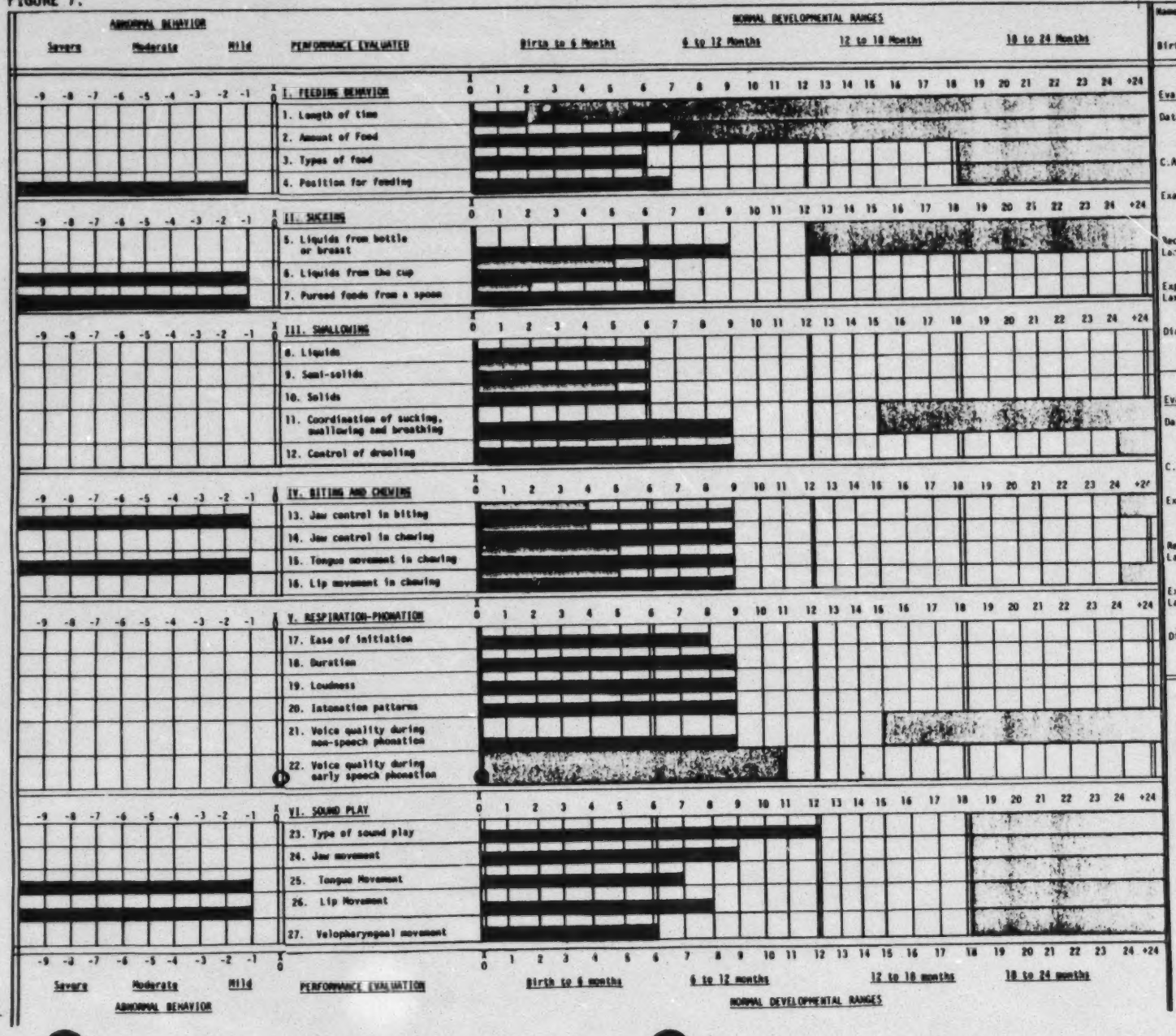
PROJECTED PROGNOSIS FOR ORAL SPEECH DEVELOPMENT

There is no measurable indication that speech production problems will exist in the future. Normal speech production is anticipated.

FIGURE 7.

## PRE-SPEECH ASSESSMENT SCALE

Suzanne Evans Morris, Ph.D.
January, 1982 Edition




Name: Carol

Birthdate:

**Evaluation #1**

Dates:

C.A.: 12 months

Examiner:

Receptive Language Age: 10 - 12 months

Expressive Language Age: 8 - 10 months

Diagnosis:

**Evaluation #2**

Dates:

C.A.:

Examiner:

Receptive Language Age:

Expressive Language Age:

Diagnosis:

**Note:**

The shaded areas on the graph represent the boundaries of the developmental range for each item.

X, 0, 7 = no scoreable behavior.



5

52

FIGURE 7.

Child: Carol

Age: 12 months

Diagnosis: Spastic Quadruplegia

Receptive Language: 10-12 months

Expressive Language: 8-10 months

GENERAL PATTERN

1. Abnormal behaviors are present in 4 of the 6 categories. However, these are extremely mild (-1). Generally, these involve mild deviations in jaw, lip, and tongue movements.
2. Mild delays in normal behaviors are present in the Sucking and Swallowing categories. These cluster at the 6-month level of development. Normal behaviors in other categories tend to be closer to the 9-month level.
3. No abnormalities or major delays are present in the Respiration-Phonation category.
4. Mild abnormalities in tongue and lip movement are present during sound play.

RECOMMENDATIONS

1. Formal treatment was not recommended. Follow-up was scheduled at 3-month intervals. Suggestions for a home program were provided for the parents and home trainer.
2. Home program emphasis was placed on reducing mild difficulties with jaw, lip, and tongue control during feeding and sound play.

PROJECTED PROGNOSIS FOR ORAL SPEECH DEVELOPMENT

As finer coordination is required for later speech development, the mild oral-motor difficulties may play a larger role in reducing speech intelligibility.

FIGURE 8.

## PRE-SPEECH ASSESSMENT SCALE

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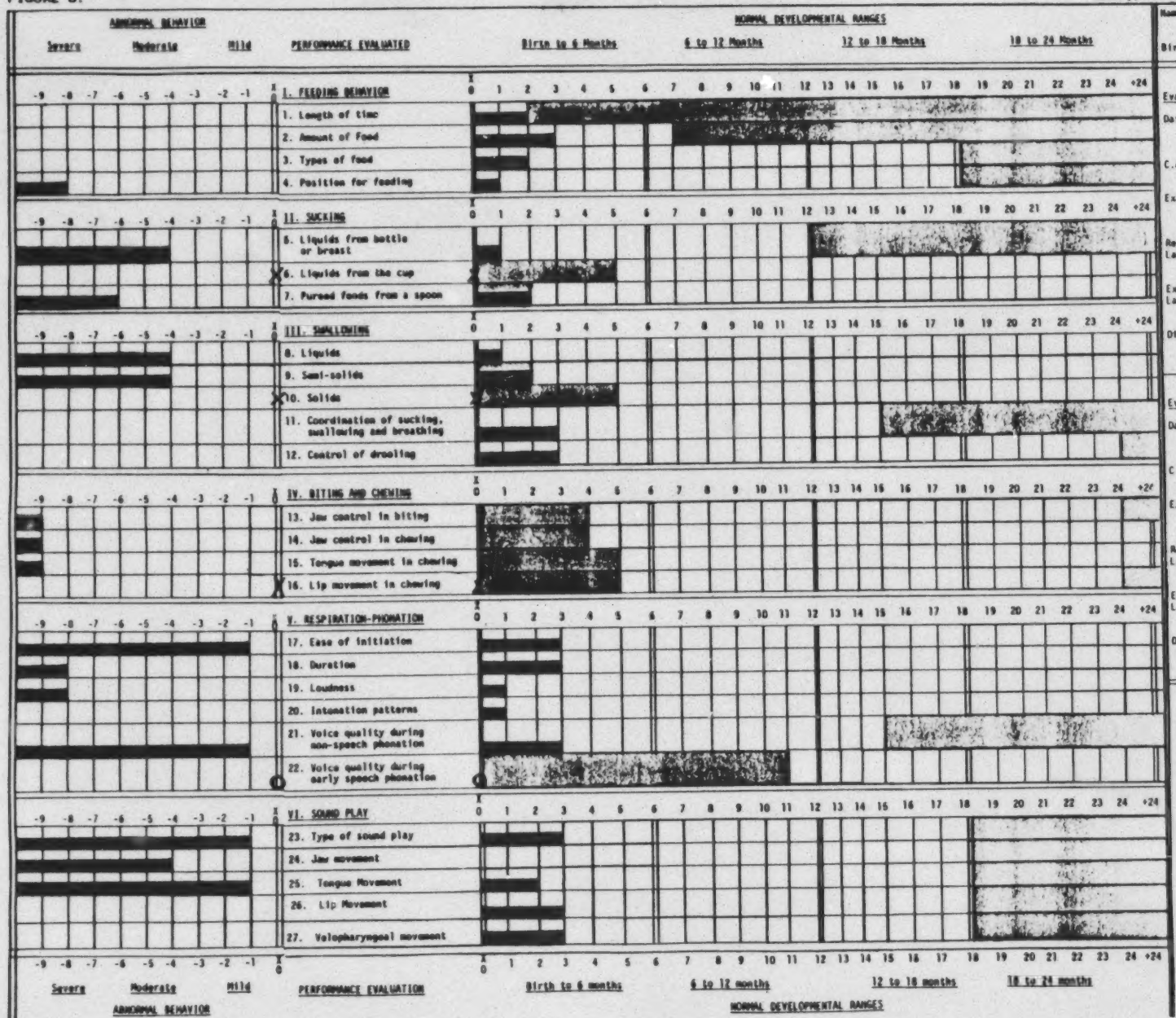
January, 1982 Edition




Name: Jennifer

Birthdate:

**Evaluation #1**

Dates:

C.A.: 7 months

Examiner:

Receptive Language Age: 3-4 months

Expressive Language Age: 2-3 months

Diagnosis:

**Evaluation #2**

Dates:

C.A.:

Examiner:

Receptive Language Age:

Expressive Language Age:

Diagnosis:

**Note:**

The shaded areas on the graph represent the boundaries of the developmental range for each item.

X, O, Y = no scoreable behavior.

FIGURE 8.

Child: Jennifer

Age: 7 months

Diagnosis: Spastic Quadruplegia

Receptive Language: 3-4 months

Expressive Language: 2-3 months

GENERAL PATTERN

1. Abnormal behaviors are present in all of the categories and in 15 out of 23 scoreable performance areas. Two-thirds of these are in the moderate-to-severe range.

2. Normal behaviors are present in all but one scoreable performance area. These cluster evenly in the 1 to 3-month range. Normal behaviors are compatible with receptive language development.

3. No scoreable behaviors are present for 3 areas requiring intake of solids and use of a cup.

4. Movement patterns of the jaw were most greatly impaired and jaw thrusting was present in both feeding and sound play areas. This was accompanied by patterns of neck and body extension.

RECOMMENDATIONS

1. Formal treatment was recommended.

2. Major emphasis within the treatment program was placed on reduction of extensor patterns of movement throughout the body. This was felt to be the underlying trigger for limitations in jaw control.

PROJECTED PROGNOSIS FOR ORAL SPEECH DEVELOPMENT

With abnormal behaviors observed in 2/3 of the scoreable areas, the prognosis for fluent, intelligible speech is guarded. The simultaneous presence of many normal, though delayed, behaviors might indicate that some speech approximations may be possible.

FIGURE 9.

PRE-SPEECH ASSESSMENT SCALE

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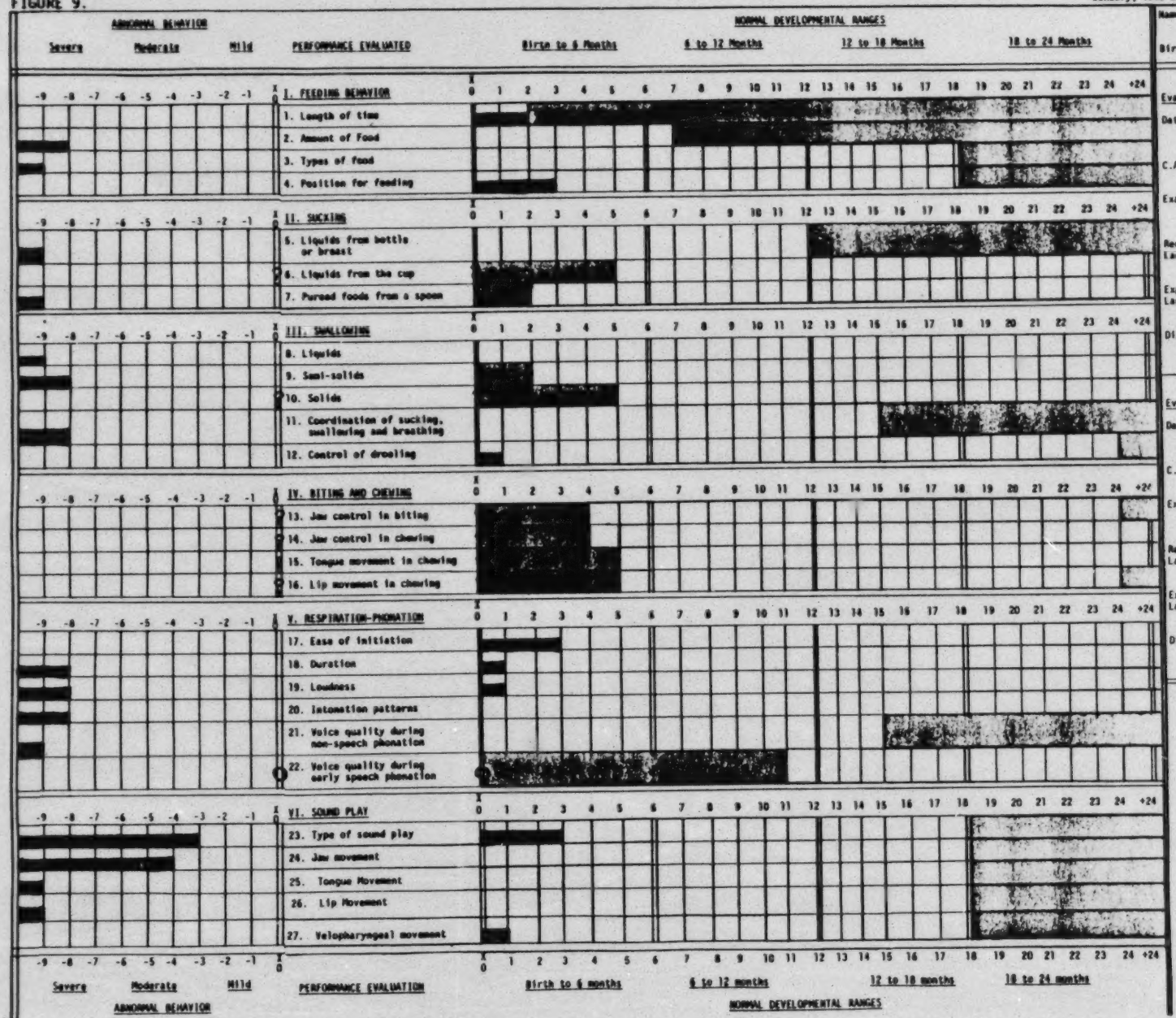
January, 1982 Edition




Name: David

Birthdate:

Evaluation #1

Dates:

C.A.: 6 months

Examiner:

Receptive Language Age: 2-3 months

Expressive Language Age: 2-3 months

Diagnosis:

Evaluation #2

Dates:

C.A.:

Examiner:

Receptive Language Age:

Expressive Language Age:

Diagnosis:

Note:

The shaded areas on the graph represent the boundaries of the developmental range for each item.

X, 0, ? = no scorable behavior.

-26-

FIGURE 9.

Child: David

Age: 6 months

Diagnosis: Pierre Robin Syndrome
Possible Athetoid Cerebral Palsy

Receptive Language: 2-3 months

Expressive Language: 2-3 months

GENERAL PATTERN

1. Severe abnormal behaviors are present in all scoreable categories and in 15 out of 20 performance areas.
2. Primary food intake is provided through tube feedings.
3. Normal feeding behaviors are not present for foods given orally.
4. Abnormal scores in respiratory-phonatory areas reflect severe difficulties with control of the pharyngeal airway and severely abnormal respiratory patterns.

RECOMMENDATIONS

1. Pre-speech/feeding treatment had been provided weekly since the age of 1 month. Minimal gains were made during that period. It was recommended that treatment be continued weekly until noticeable growth of the mandible and pharynx were observed. As anatomical changes would provide greater intra-oral space for tongue movement and a reduction in respiratory stress, more intensive treatment was delayed.
2. Primary treatment emphasis was placed on improvement of head and trunk control to provide a more stable support for oral, pharyngeal, and respiratory control.
3. Specific activities were included to increase jaw control for mouth closure and to build acceptance for toys, fingers, and food in the mouth.
4. Direct feeding activities emphasized the development of a more consistent swallowing pattern and the improvement of jaw, lip, and tongue control in maintaining the food bolus within the mouth.
5. A primary emphasis was placed on the development and use of eye gaze, vocalization, and body movement signals to provide communication control at mealtimes.

PROJECTED PROGNOSIS FOR ORAL SPEECH DEVELOPMENT

Due to the severe nature of the oral-motor impairment, the prognosis for oral speech is extremely poor. Primary emphasis in treatment programming should be placed on the development of a total communication system that would include gestures/signs and vocalization at this time, and a picture or symbol communication board in the future.

FIGURE 10.

PRE-SPEECH ASSESSMENT SCALE

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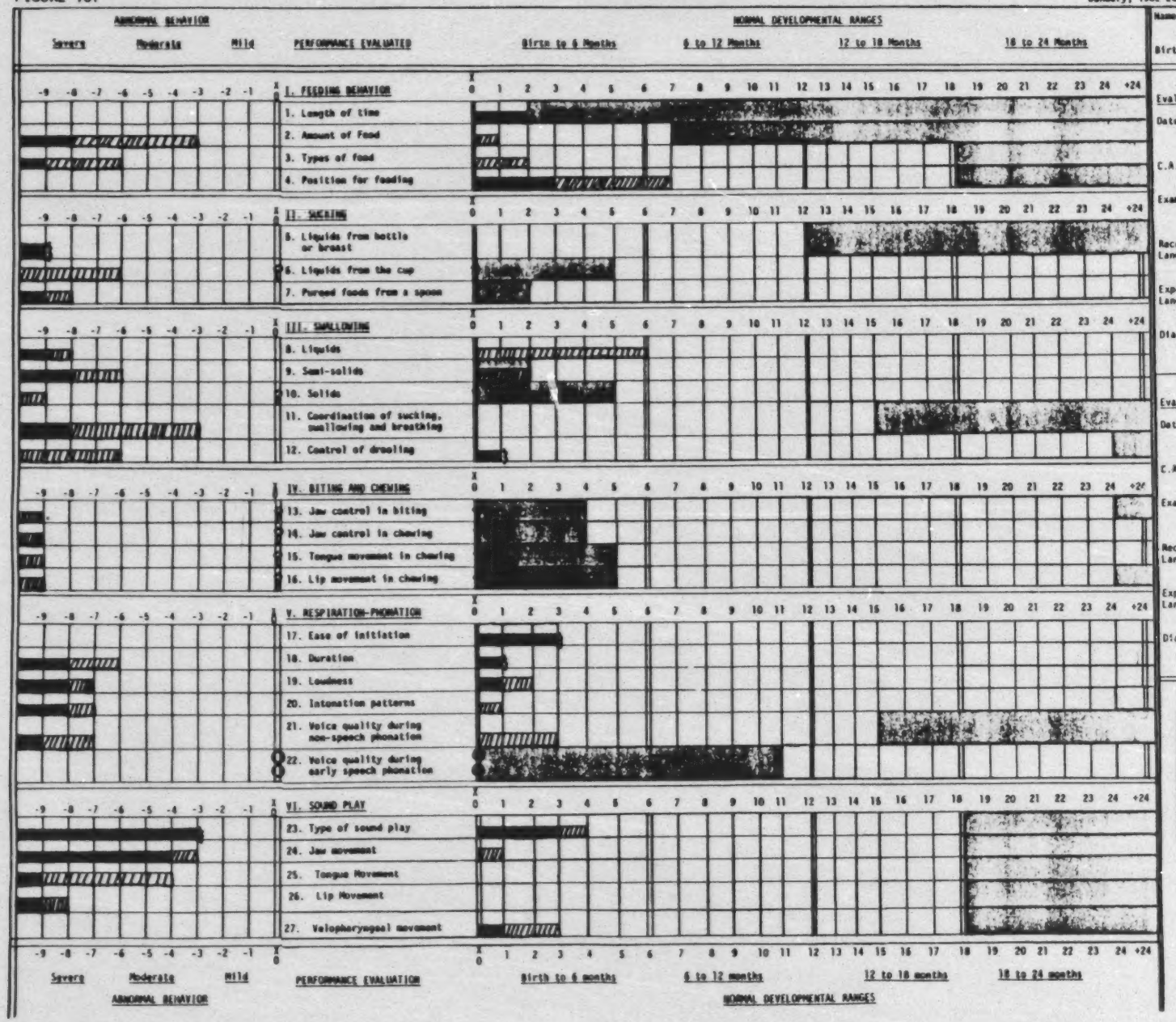
January, 1982 Edition




Name: David

Birthdate:

**Evaluation #1**

Dates:

C.A.: 6 months

Examiner:

Receptive Language Age: 2-3 months

Expressive Language Age: 2-3 months

Diagnosis:

**Evaluation #2**

Dates:

C.A.: 14 months

Examiner:

Receptive Language Age: 8 months

Expressive Language Age: 5-6 months

Diagnosis:

-28-

Note:
The shaded areas on the graph represent the boundaries of the developmental range for each item.

X, 0, 1 = no scoreable behavior.

Evaluation #1

Evaluation #2

FIGURE 10.

Child: David

Age: 14 months

Diagnosis: Pierre Robin Syndrome
Possible Athetoid Cerebral Palsy

Receptive Language: 8 months

Expressive Language: 5-6 months

TREATMENT PROGRAM BETWEEN 6 AND 14 MONTHS

Primary emphasis was placed on development of neck and shoulder girdle control in order to improve the functional base of stability for movement of the oral-pharyngeal and respiratory-phonatory systems. Specific procedures to obtain greater jaw and lip closure and general tongue movement during sucking and swallowing were included during treatment sessions and oral and tube-fed meals at home. Mealtime communication skills were enhanced through use of eye gaze, body movement, and vocalization to indicate readiness, needs, and preferences during oral feedings. Frequency of treatment was increased to three hour-long sessions per week for a 6-week period between 12 and 14 months.

GENERAL PATTERN FOLLOWING 8 MONTHS OF TREATMENT

1. Comparison of abnormal behaviors at 6 and 14 months reveals a reduction in overall severity of abnormal patterns when compared to previously scored performance areas. A higher percentage of moderate and mild behaviors is present.

| | Severe | Moderate | Mild |
|---|---|---|---|
| 6 months | 87% | 6% | 6% |
| 14 months | 55% | 27% | 18% |

2. Normal behaviors are now present in 15 out of 26 scoreable performance areas. This includes significant normal behaviors in feeding and respiration-phonation which were not present at 6 months. Normal behaviors are primarily in the 1 to 3-month range.

3. More food is taken by mouth during a 30-minute feeding period. Liquids (by cup), semi-solids, and lumpy solids are included in the diet. Normal behaviors are present during swallowing of liquids and semi-solids. Sucking behaviors are less abnormal for liquids from the cup than for pureed foods from the spoon. However, swallowing of the more solid pureed foods is accomplished with less abnormality because of a lesser tendency for food to pool in the front of the mouth and run out because of poor lip and tongue control.

4. Marked gains were made in the coordination of sucking, swallowing, and breathing. Difficulties related to respiratory distress and incoordination which were present at 6 months are no longer observed during feeding. Sucking and swallowing continue to be poorly coordinated.

5. Improvements in neck and shoulder girdle control and greater functional activation of the neck flexor and abdominal muscle groups were particularly related to an anatomical enlargement of the oral and pharyngeal spaces. With downward and forward growth of the mandible, the severe micrognathia of the earlier months became reduced. This created a greater intra-oral space to contain the tongue and less intrusion of the tongue into the pharyngeal airway. Breathing became easier and swallowing became more active, resulting in less pooling of mucus in the pharynx. The head was no longer held in a hyperextended pattern to increase the diameter of the pharynx in order to enhance survival breathing. This led to greater functional activation of the flexor muscle groups and greater balance between flexion and extension and rotation in the neck and shoulder girdle. It was felt that this basic change in neck and shoulder girdle control enabled the jaw, tongue, and lips to function more efficiently in handling food and liquid.

6. Anatomical changes and improved control of neck and abdominal muscles contributed to the development of easier control of respiration-phonation. A general reduction in the severity of respiratory-phonatory skills was observed in all categories. Normal features in crying and early pleasurable vowels were also observed and scored at the 1 to 3-month level.

FIGURE 11.

PRE-SPEECH ASSESSMENT SCALE

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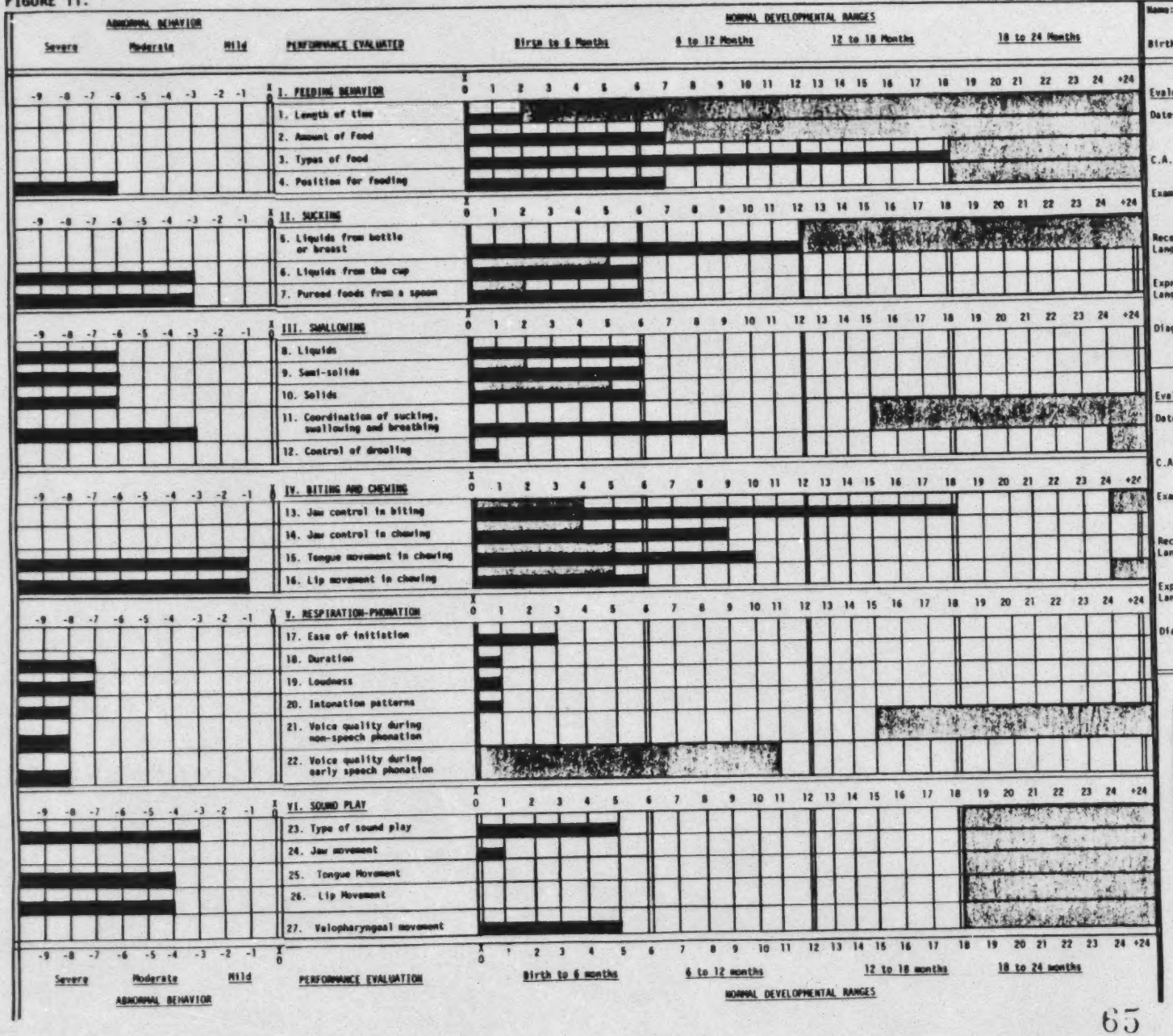
January, 1982 Edition




Name: Brian

Birthdate:

Evaluation #1

Dates:

C.A.: 3yrs 1mo.

Examiner:

Receptive Language Age: 2yrs 6mos.

Expressive Language Age: 9-10 mos.

Diagnosis:

Evaluation #2

Dates:

C.A.:

Examiner:

Receptive Language Age:

Expressive Language Age:

Diagnosis:

Note:

The shaded areas on the graph represent the boundaries of the developmental range for each item.

X, O, ? = no scoreable behavior.

-30-

61½

65

FIGURE 11.

Child: Brian

Age: 3 years 1 month

Diagnosis: Athetoid Cerebral Palsy

Receptive Language: 2 years 6 months

Expressive Language: 9-10 months

GENERAL PATTERN

1. Abnormal behaviors, primarily in the mild to moderate ranges, are present in all categories.

2. Normal behaviors are present in all categories. However, the lowest frequency of normal behaviors occurs in the Respiration-Phonation and Sound Play categories.

3. No absent behaviors or no-behavior scores are recorded.

4. Overall ranges of normal development are primarily between the 5 to 12-month level. Scores are highest for Biting and Chewing and lowest for Respiration-Phonation and Sound Play categories.

5. Major dysarthric involvement appears to be in the Respiration-Phonation category. Abnormal behaviors in the severe range occur in five of the six areas. These abnormalities preclude any normal behaviors in the two voice quality areas and reflect severe limitations in duration, loudness, and intonation patterns.

6. Movement patterns involving the jaw appear to be less impaired than those involving the tongue and lips. Jaw movement in the biting and chewing areas ranges from 9 to 18 months with no competing abnormal patterns. Tongue and lip movements during chewing are in the 6 to 10-month levels, with mild abnormalities interfering. Tongue and lip movements show no normal components in the Sound Play category with competing abnormal movements at the moderate level of severity.

7. Despite abnormal behaviors influencing development of oral-motor skills in feeding, there is a marked discrepancy between use of oral movements in feeding and development and use of similar movements for sound play. An example of this can be seen by comparing tongue and lip movements in the Biting and Chewing and Sound Play categories. Tongue movement in chewing is at the 10-month level and Lip movement in chewing is at the 6-month level. Moderately abnormal behaviors occur for both tongue and lip movements during phonation and no normal behaviors were recorded. This raises a question as to the co-existence of both a dysarthria and a dyspraxia interfering with speech development. It may also reflect added stress placed on the articulators by a highly abnormal respiratory-phonatory system.

RECOMMENDATIONS AND FOLLOW-UP

1. Treatment was recommended. Pre-speech programming was implemented for two 60-minute sessions per week.

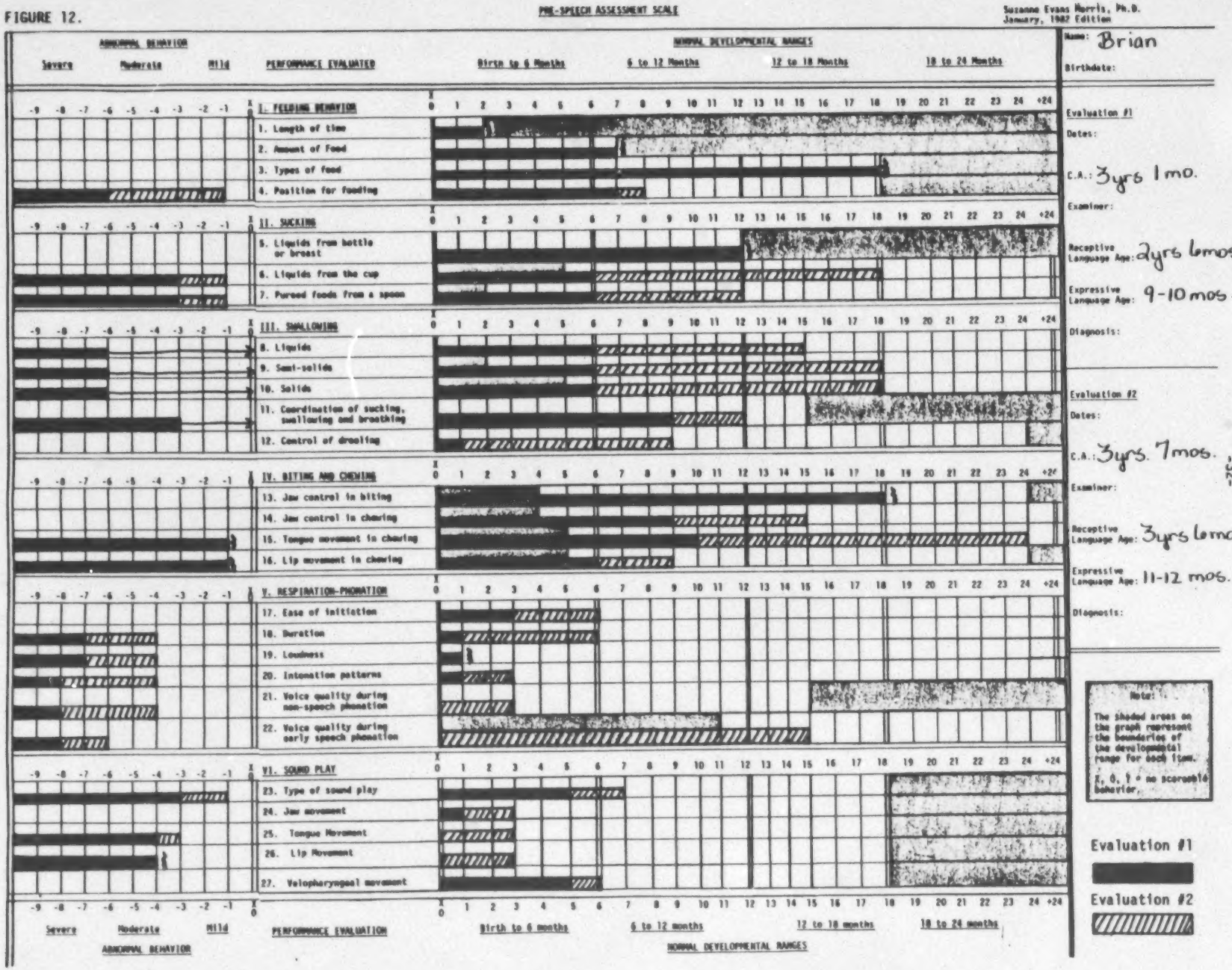
2. Primary treatment emphasis was directed toward development of greater trunk stability, head control, and more rapid balance reactions. This was based on the observation that the underlying feature of the abnormal behaviors in pre-speech areas was that of poor postural stability and control of head and trunk movement.

3. Specific work in the pre-speech area emphasized improvement of head control for better swallowing and easier phonation, and increased control of abdominal muscles for easier, louder, and more sustained phonation.

PROJECTED PROGNOSIS FOR ORAL SPEECH DEVELOPMENT

Prognosis for fluent oral speech is guarded. Moderate-to-severe abnormalities are present in all areas of oral-motor and respiratory-phonatory functioning. The possibility of a combined disorder of movement coordination and motor planning reduced the probability of fluent speech. A total communication approach including both vocal and non-vocal modes of expression should be used.

FIGURE 12.


PRE-SPEECH ASSESSMENT SCALE
Suzanne Evans Morris, Ph.D.
January, 1982 Edition
ABNORMAL BEHAVIOR
Severe
Moderate
Mild
PERFORMANCE EVALUATED
NORMAL DEVELOPMENTAL RANGES
Birth to 6 Months
6 to 12 Months
12 to 18 Months
18 to 24 Months
I. FEEDING BEHAVIOR
1. Length of time
2. Amount of Food
3. Types of food
4. Position for feeding
II. SUCKING
5. Liquids from bottle or breast
6. Liquids from the cup
7. Pureed foods from a spoon
III. SWALLOWING
8. Liquids
9. Semi-solids
10. Solids
11. Coordination of sucking, swallowing and breathing
12. Control of drooling
IV. BITING AND CHEWING
13. Jaw control in biting
14. Jaw control in chewing
15. Tongue movement in chewing
16. Lip movement in chewing
V. RESPIRATION-PHONATION
17. Ease of initiation
18. Duration
19. Loudness
20. Intonation patterns
21. Voice quality during non-speech phonation
22. Voice quality during early speech phonation
VI. SOUND PLAY
23. Type of sound play
24. Jaw movement
25. Tongue Movement
26. Lip Movement
27. Velopharyngeal movement
PERFORMANCE EVALUATION
NORMAL DEVELOPMENTAL RANGES
Name: Brian
Birthdate:
Evaluation #1
Dates:
C.A.: 3yrs 1mo.
Examiner:
Receptive Language Age: 2yrs 6mos
Expressive Language Age: 9-10 mos.
Diagnosis:
Evaluation #2
Dates:
C.A.: 3yrs. 7mos.
Examiner:
Receptive Language Age: 3yrs 6mos
Expressive Language Age: 11-12 mos.
Diagnosis:
Note:
The shaded areas on the graph represent the boundaries of the developmental range for each item.
X, 0, 1 = no scorable behavior.
Evaluation #1
Evaluation #2

-32-

FIGURE 12.

Child: Brian

Age: 3 years 7 months

Diagnosis: Athetoid Cerebral Palsy

Receptive Language: 3 years 6 months

Expressive Language: 11-12 months

SIX-MONTH TREATMENT PROGRAM

Brian's treatment program emphasized the underlying control of the neck and shoulder girdle and stability of the trunk. All abnormal patterns in the oral mechanism and respiratory-phonatory system were elicited and exaggerated when he became afraid of falling. Compensatory increases in postural tone and movements with shoulder girdle flexion and neck hyperextension occured in response to poor trunk stability and slow equilibrium reactions. Carryover of more appropriate tone and movement patterns was reflected in improved head control during swallowing and vocalization and was integrated into specific work on control of abdominal muscles to support longer, louder phonation.

GENERAL PATTERN FOLLOWING 6 MONTHS OF TREATMENT

1. Abnormal behaviors during swallowing were eliminated and normal range scores in these areas fell between 12 and 18 months.

2. Normal behaviors now occur in all performance areas.

3. The overall range of normal development has increased so that many scores now fall in the 12 to 18-month level. The major exception to this is in the Respiration-Phonation category. These behaviors cluster in the 3 to 6-month level.

4. Major reductions in abnormal behaviors and increases in normal behaviors occurred in the Respiration-Phonation category. Some normal behaviors are now seen in all five performance areas.

5. Major changes involving jaw, lip, and tongue control occurred in feeding activities. In general, the normal level of control went from approximately the 6-month level to the 15-month level during 6 months of treatment. Discrepancies between jaw movement and movement of the lips and tongue are not as apparent. Tongue movement in chewing has increased to the 24 month-level, with some ability to transfer food across midline. Intermittent tongue-tip elevation was also observed during swallowing. Lip movement improved during sucking of pureed foods from the spoon and in control of food and saliva loss during both sucking and swallowing. The major observable discrepancy is in chewing, where jaw movement is scored at 15 months and tongue movement is scored at 24 months, but lip movement is only scored at 9 months. In addition, mild abnormalities continue to exist for both tongue and lip movements during sucking and chewing but are absent for jaw movements. Thus, although major improvements have occurred, the impression of greater dysarthric involvement of lips and tongue continues to be supported.

6. Despite major gains in all feeding areas and in respiration-phonation, gains in the Sound Play category are minimal. This supports an impression of a mixed dysarthria and dyspraxia. With the marked improvements in reducing the impact of dysarthric involvement, the continued severe component of Brian's speech disorder appears to be that of a motor planning problem or dyspraxia. He appears to be unable to bring together the various pre-speech components of oral movements and phonation in order to use them in a volitional manner for speech production. In higher level motor planning tasks and speech imitation tasks, the impression of a major dyspraxic component was strongly supported.

FIGURE 13.

PRE-SPEECH ASSESSMENT SCALE

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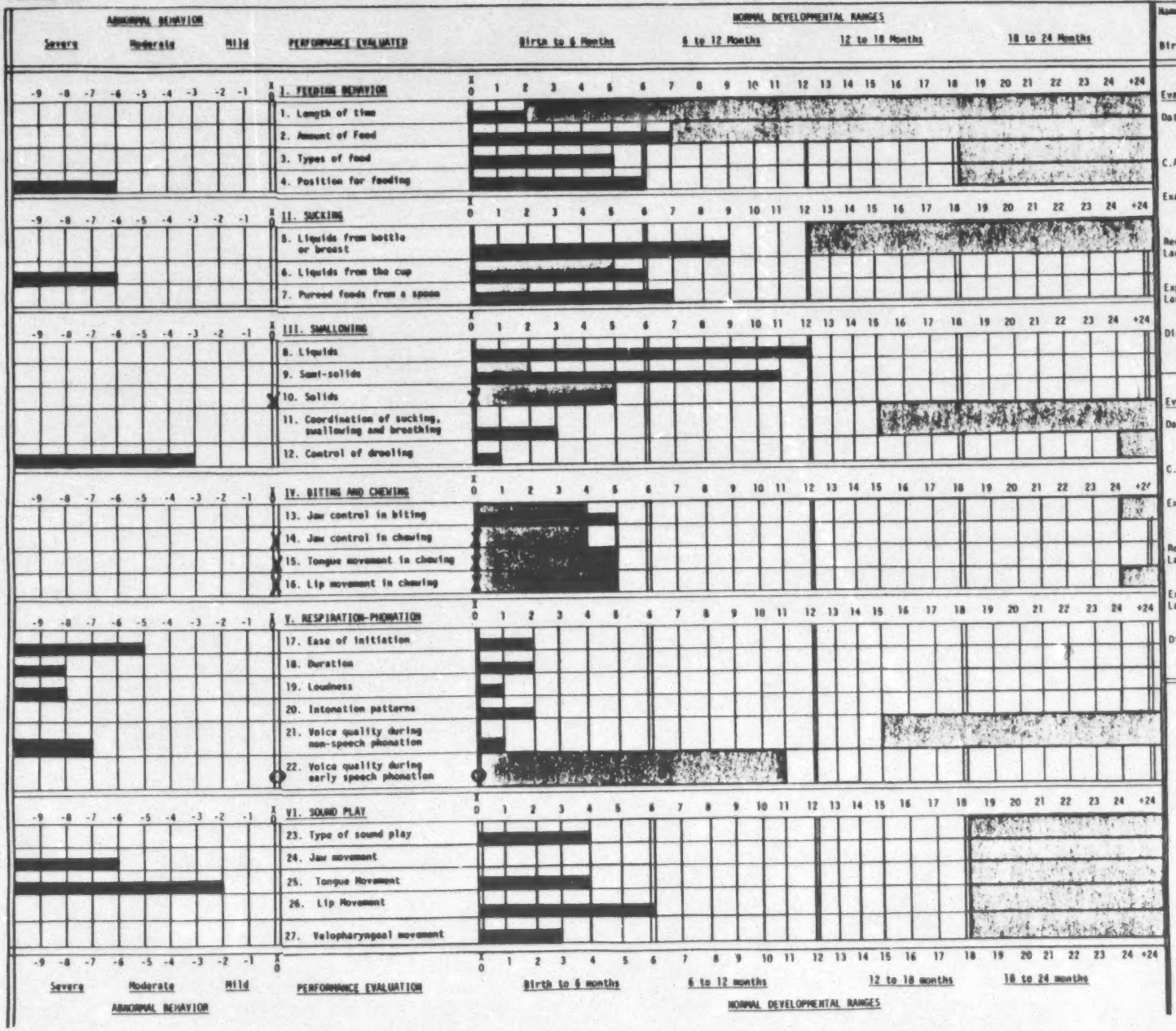
January, 1982 Edition




Name: Ben

Birthdate:

Evaluation #1

Dates:

C.A.: 12 months

Examiner:

Receptive Language Age: 11-12 months

Expressive Language Age: 5-6 months

Diagnosis:

Evaluation #2

Dates:

C.A.:

Examiner:

Receptive Language Age:

Expressive Language Age:

Diagnosis:

Note:

The shaded areas on the graph represent the boundaries of the developmental range for each item.

X, 0, ? = no scoreable behavior.

FIGURE 13.

Child: Ben

Age: 12 months

Diagnosis: Mixed Spastic And Athetoid Cerebral Palsy

Receptive Language: 11-12 months

Expressive Language: 5-6 months

GENERAL PATTERN

1. Abnormal behaviors are present in 5 of the 6 categories and in 9 performance areas. Scores cluster in a moderate to severe range of -5 to -8. Two areas were scored at a mild level of abnormality.

2. Normal behaviors are scored in all categories, with ranges of 3 to 12 months in Sucking and Swallowing categories and 1 to 6 months in Respiration-Phonation and Sound Play categories.

3. No-behavior scores are present for Swallowing: Solids and in chewing areas requiring successful management of solids.

4. Major areas of dysarthric involvement are those in the Respiration-Phonation and Sound Play categories. The 10 scoreable areas include 6 with abnormal behaviors. Eight of the normal scores are delayed to the 1 to 4-month range of development.

5. Abnormal jaw movement was the greatest deterrent to normal function in the areas of Sucking: Liquids from the cup, Swallowing: Control of drooling, Respiration-Phonation: Ease of initiation, and Sound Play: Jaw movement. Jaw movement was the only area in which no normal movement was observed.

RECOMMENDATIONS AND FOLLOW-UP

1. Treatment was recommended. Because of the unavailability of an appropriate therapist to work on pre-speech skills, a home program was developed.

2. Suggestions were provided to the parents and physical therapist for reducing the strong associated reactions (including the jaw thrust) during general movement and play.

3. Specific treatment suggestions included changes in positioning for feeding, introduction of lumpy solids, and activities to stop the jaw thrust during sound play and develop greater movement of the oral mechanism during non-feeding periods.

PROJECTED PROGNOSIS FOR ORAL SPEECH DEVELOPMENT

Prognosis for fluent oral speech is guarded. The moderate level of abnormality in the ease with which phonation is initiated and the use of jaw movement in sound production may be considered poor prognosticators for speech development. However, oral movements in feeding are essentially normal (though delayed) which theoretically should provide an adequate pool of sensorimotor experiences from which to draw upon for development of individual speech sounds. Indeed, normal tongue, lips, and velopharyngeal movements are already present at a 3 to 6-month level in sound play. A reduction in jaw control problems would signal a more favorable prognosis for speech development. A total communication system, including gestures/signs, pointing to pictures or symbols, and vocalization is recommended.

FIGURE 14.

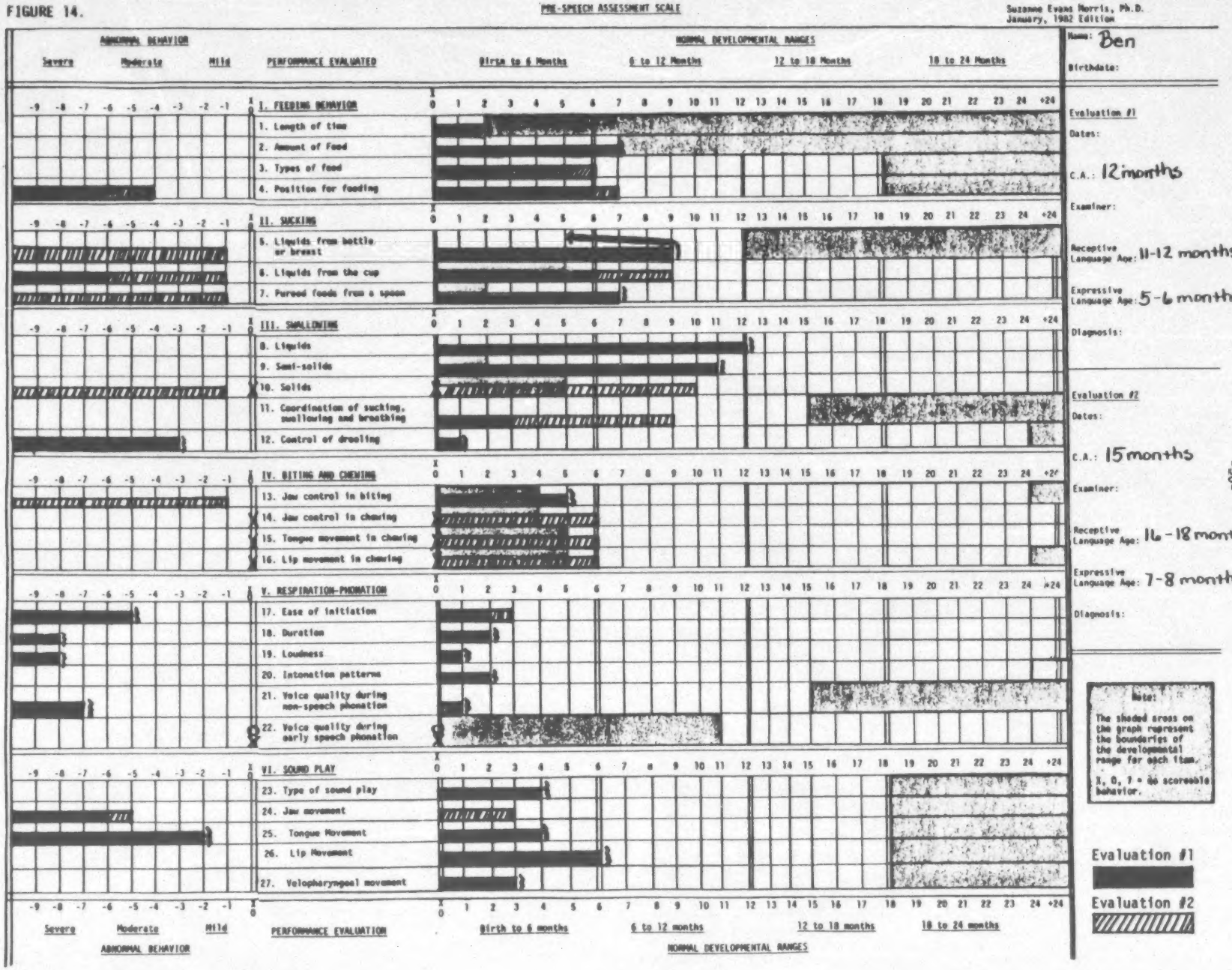

PRE-SPEECH ASSESSMENT SCALE
Suzanne Evans Morris, Ph.D.
January, 1982 Edition
ABNORMAL BEHAVIOR
Severe
Moderate
Mild
PERFORMANCE EVALUATED
NORMAL DEVELOPMENTAL RANGES
Birth to 6 Months
6 to 12 Months
12 to 18 Months
18 to 24 Months
I. FEEDING BEHAVIOR
1. Length of time
2. Amount of Food
3. Types of food
4. Position for feeding
II. SUCKING
5. Liquids from bottle or breast
6. Liquids from the cup
7. Pureed foods from a spoon
III. SWALLOWING
8. Liquids
9. Semi-solids
10. Solids
11. Coordination of sucking, swallowing and breathing
12. Control of drooling
IV. BITING AND CHEWING
13. Jaw control in biting
14. Jaw control in chewing
15. Tongue movement in chewing
16. Lip movement in chewing
V. RESPIRATION-PHONATION
17. Ease of initiation
18. Duration
19. Loudness
20. Intonation patterns
21. Voice quality during non-speech phonation
22. Voice quality during early speech phonation
VI. SOUND PLAY
23. Type of sound play
24. Jaw movement
25. Tongue Movement
26. Lip Movement
27. Velopharyngeal movement
PERFORMANCE EVALUATION
NORMAL DEVELOPMENTAL RANGES
ABNORMAL BEHAVIOR
Name: Ben
Birthdate:
Evaluation #1
Dates:
C.A.: 12 months
Examiner:
Receptive Language Age: 11-12 months
Expressive Language Age: 5-6 months
Diagnosis:
Evaluation #2
Dates:
C.A.: 15 months
Examiner:
Receptive Language Age: 16-18 months
Expressive Language Age: 7-8 months
Diagnosis:
Note:
The shaded areas on the graph represent the boundaries of the developmental range for each item.
X, 0, 7 = no scoreable behavior.
Evaluation #1
Evaluation #2

FIGURE 14.

Child: Ben

Age: 15 months

Receptive Language: 16-18 months

Expressive Language: 7-8 months

Diagnosis: Mixed Spastic and Athetoid Cerebral Palsy

THREE-MONTH HOME PROGRAM (12-15 months)

The home program centered around activities to improve positioning for feeding, to achieve a reduction in jaw thrusting during non-feeding activities and to develop the successful handling of solid foods.

GENERAL PATTERNS FOLLOWING 3 MONTHS OF A HOME PROGRAM

1. Scoreable behaviors were present in all performance areas except Respiration-Phonation: Voice quality during early speech phonation.

2. Abnormal behaviors decreased and were now present at the mild level of severity in 6 areas of feeding. These were all related to mild degrees of jaw and tongue dysfunction.

3. Measurable gains were achieved in Feeding Behavior: Types of food, Feeding Behavior: Position for feeding, Swallowing: Coordination of sucking, swallowing, and breathing, and Sound Play: Jaw movement. Solids were given as a regular part of the diet and chewing skills emerged with scores in the normal ranges.

4. Only 2 areas in the Respiration-Phonation and Sound Play categories showed measurable gains (Respiration-Phonation: Ease of initiation and Sound Play: Jaw movement).

5. A general trend toward reduction in severity of the jaw control disorder was observed. In the area of Sucking: Liquids from the cup, abnormal behaviors decreased from -6 to -1 (from moderate to mild) and normal developmental skills increased from 6 to 9 months. In the area of Sound Play: Jaw movement, abnormal behaviors decreased from -6 to -5, allowing a normal range score at the 3-month level. Emergence of mildly abnormal jaw movements during Sucking: Liquids from bottle or breast, Sucking: Pureed foods from a spoon, and Biting and Chewing: Jaw control in biting was felt to be a reflection of increased attempts to be involved communicatively at a more volitional level of function during the meal.

6. Overall changes in function were limited to the categories measuring feeding skills and interactions. Overall changes in function were not observed in the Respiration-Phonation and Sound Play catetories.

7. An intensive program of pre-speech therapy was recommended for the summer months. Programmatic emphasis should be placed on the development of the underlying control of vocalization and sound production abilities.

FIGURE 15.

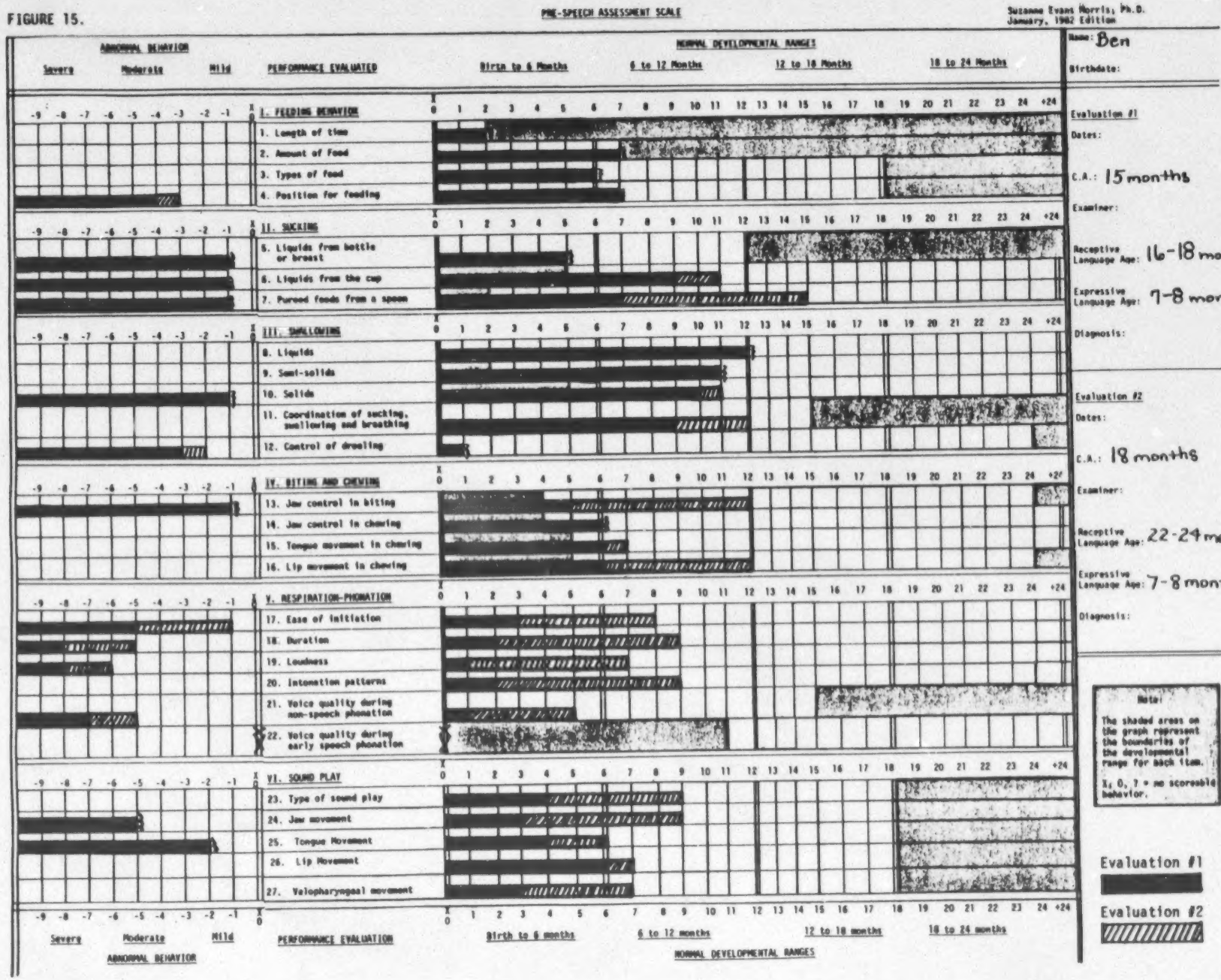

PRE-SPEECH ASSESSMENT SCALE
Suzanne Evans Morris, Ph.D.
January, 1982 Edition
ABNORMAL BEHAVIOR
Severe
Moderate
Mild
PERFORMANCE EVALUATED
NORMAL DEVELOPMENTAL RANGES
Birth to 6 Months
6 to 12 Months
12 to 18 Months
18 to 24 Months
I. FEEDING BEHAVIOR
1. Length of time
2. Amount of Food
3. Types of food
4. Position for feeding
II. SUCKING
5. Liquids from bottle or breast
6. Liquids from the cup
7. Pureed foods from a spoon
III. SWALLOWING
8. Liquids
9. Semi-solids
10. Solids
11. Coordination of sucking, swallowing and breathing
12. Control of drooling
IV. BITING AND CHEWING
13. Jaw control in biting
14. Jaw control in chewing
15. Tongue movement in chewing
16. Lip movement in chewing
V. RESPIRATION-PHONATION
17. Ease of initiation
18. Duration
19. Loudness
20. Intonation patterns
21. Voice quality during non-speech phonation
22. Voice quality during early speech phonation
VI. SOUND PLAY
23. Type of sound play
24. Jaw movement
25. Tongue Movement
26. Lip Movement
27. Velopharyngeal movement
Name: Ben
Birthdate:
Evaluation #1
Dates:
C.A.: 15 months
Examiner:
Receptive Language Age: 16-18 months
Expressive Language Age: 7-8 months
Diagnosis:
Evaluation #2
Dates:
C.A.: 18 months
Examiner:
Receptive Language Age: 22-24 months
Expressive Language Age: 7-8 months
Diagnosis:
Note:
The shaded areas on the graph represent the boundaries of the developmental range for each item.
X, 0, ? = no scoreable behavior.
Evaluation #1
Evaluation #2

FIGURE 15.

Child: Ben

Age: 18 months

Receptive Language: 22-24 months

Expressive Language: 7-8 months

Diagnosis: Mixed Spastic and Athetoid Cerebral Palsy

THREE-MONTH PRE-SPEECH PROGRAM (15-18 MONTHS)

Ben was seen for 4 hour-long therapy sessions per week for a period of 3 months. Treatment emphasis was placed upon the development of trunk stability and head and trunk righting and equilibrium reactions in order to influence muscle systems upon which respiratory-phonatory control and jaw stability are developed. Work on cup drinking, spoon feeding, and chewing skills was included during each therapy session. Easy vocalization was encouraged and increased sound play was facilitated during both feeding and non-feeding periods. The use of a gesture/signing system was encouraged to provide an early communication system which would not place pressure on the use of vocalization as the only means of interaction and communication.

GENERAL PATTERN FOLLOWING 3 MONTHS OF PRE-SPEECH TREATMENT

1. Gains were observed in all 6 categories. Reduction of the extent of abnormal behaviors was particularly noted in the Respiration-Phonation category. Behaviors progressed from the severe to moderate range of abnormality in 3 areas and from the moderate to mild range in 1 area.

2. The greatest gains were recorded in the Respiration-Phonation and Sound Play categories. Normal range scores increased from the 1 to 3-month level to the 6 to 9-month level. This was accompanied by reductions in the extent of abnormal interfering behaviors in the Respiration-Phonation categories.

3. Feeding behaviors showed gains of 1 to 8 months in 7 of the 12 areas measured. These gains extended the overall profile toward the 12-month level of development in the six categories.

4. In the category of Sound Play, gains in jaw control and tongue movement were observed. However, mildly abnormal components of jaw and tongue movement were still observed in the feeding categories. Jaw control in chewing and Tongue movement in chewing showed the greatest degrees of developmental delay within the performance areas in the feeding categories. Jaw and tongue movement continued to be the areas of poorest function in both feeding and sound play categories.

FIGURE 16.

## PRE-SPEECH ASSESSMENT SCALE

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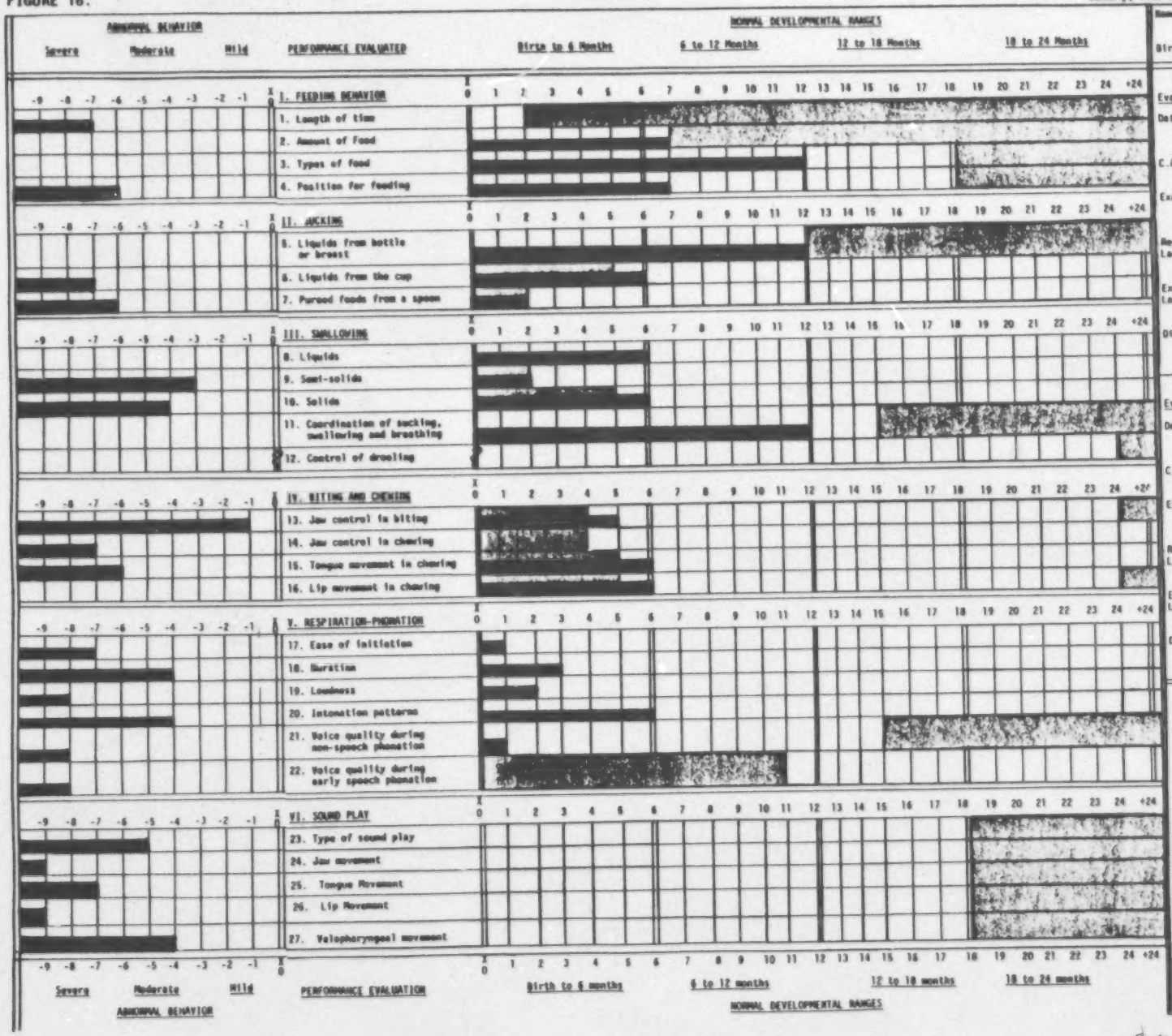
January, 1982 Edition




Name: Mark

Birthdate:

Evaluation #1

Dates:

C.A.: 9 yrs. 2 mos.

Examiner:

Receptive Language Age: 8-9 yrs.

Expressive Language Age: 8-9 yrs. (written)

Diagnosis:

Evaluation #2

Dates:

C.A.:

Examiner:

Receptive Language Age:

Expressive Language Age:

Diagnosis:

Note:
The shaded areas on the graph represent the boundaries of the developmental range for each item.
X, 0, 7 = no scorable behavior.

-10-

82

83

FIGURE 16.

Child: Mark

Age: 9 yrs. 2 mos.

Diagnosis: Athetoid Cerebral Palsy

Receptive Language: 8-9 years

Expressive Language: 8-9 years (written)

GENERAL PATTERN

1. Abnormal behaviors are present in all categories and in 20 of the 27 performance areas. Scores are primarily in the moderate or severe ranges.
2. Normal behaviors are present in all categories except Sound Play. Normal scores generally cluster around the 6-month level in the feeding categories and the 1 to 3-month level in the Respiration-Phonation category.
3. The greatest degree of abnormality and delay is seen in the Respiration-Phonation and Sound Play categories.
4. Movement patterns of the jaw and lips were most greatly impaired in Sound Play. The greatest delays combined with abnormality in the Sucking and Swallowing categories were related to jaw and lip difficulties in the spoon feeding of semi-solids.

RECOMMENDATIONS

1. Mark's pre-speech behaviors had plateaued for a period of 1 year. Although he was in a noontime feeding program, it was difficult for him to learn new patterns of oral-motor control in the group environment of the school cafeteria. Speech therapy sessions were limited to 15-minute sessions twice per week. Specialized work on an augmentative communication system was provided by his classroom teacher.
2. An intense block of treatment with weekly, individual 90-minute sessions was recommended.
3. The treatment program was implemented for a 4-month period during the regular lunch period. All sessions were initially held in a quiet therapy room and as new skills were established, a portion of each therapy lunch hour was held in the cafeteria with the other children.
4. Primary treatment emphasis was placed on the development of quiet control of the trunk and establishment of a more forward head position during eating and vocalization.
5. Specific emphasis during feeding and vocalization was directed toward development of greater jaw stability and controlled movement during spoon feeding, cup drinking, and chewing. A wider variety of vocalizations and vowel and consonant sounds was incorporated within and following the mealtime.
6. Work on the development of communication strategies to provide guidance and control of the speed of presentation of food and liquid and the readiness of the body and mouth for feeding was given priority in all sessions

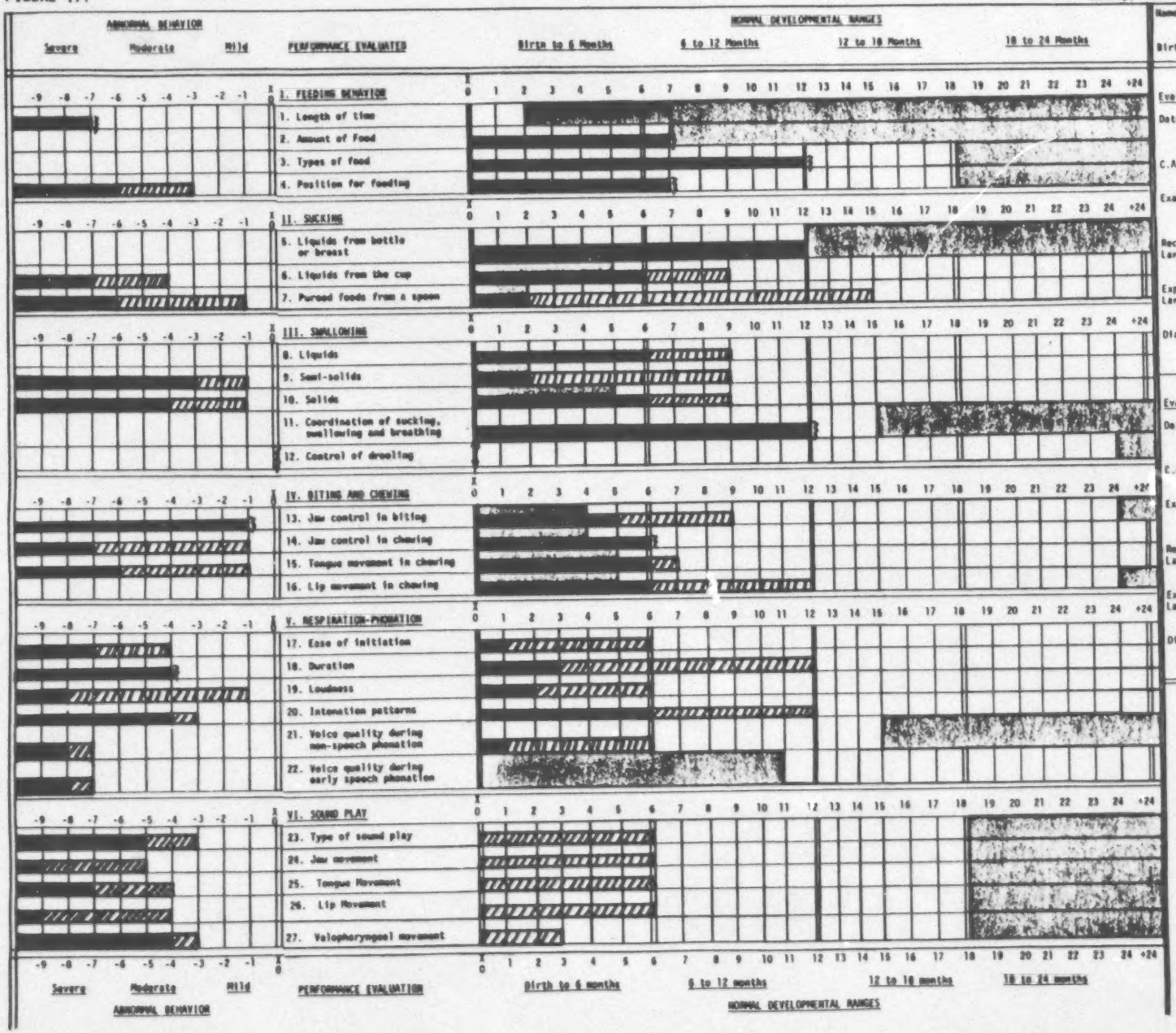
PROJECTED PROGNOSIS FOR ORAL SPEECH DEVELOPMENT

Due to the severe and encompassing nature of the pre-speech impairment, oral speech will not be utilized as the primary means of communication. A computerized communication board is currently used for communication and school work. Vocalization and an easily produced "yes" and "no" are realistic and can be developed more fully with treatment to augment his total communication system. Greater control of drooling and facial grimacing through a feeding program are also realistic and will increase his social acceptability as a communicator.

FIGURE 17.

PRE-SPEECH ASSESSMENT SCALE

Suzanne Evans Morris, Ph.D.
January, 1982 Edition




Name: Mark

Birthdate:

Evaluation #1

Dates:

C.A.: 9yrs. 2mos.

Examiner:

Receptive Language Age: 8-9yrs.

Expressive Language Age: 8-9yrs. (written)

Diagnosis:

Evaluation #2

Dates:

C.A.: 9yrs. 8mos.

Examiner:

Receptive Language Age: Age level

Expressive Language Age: Age level (written)

Diagnosis:

Note:
The shaded areas on the graph represent the boundaries of the developmental range for each item.
X, 0, ? = no scoreable behavior.

Evaluation #1

Evaluation #2

-42-

FIGURE 17.

Child: Mark

Age: 9 years 8 months

Diagnosis: Athetoid Cerebral Palsy

Receptive Language: Age level

Expressive Language: Age level (written)

SIX-MONTH TREATMENT PROGRAM

Mark was seen weekly for an intensive 90-minute therapy session that combined work on feeding, sound play, and communicative strategies to develop a gestural and vocal interaction system with the feeder at mealtimes. The underlying emphasis of the program focused on the development and awareness of a quiet body upon which controlled, graded movement could be facilitated. The ability to control the jaw in both a stable open and closed position led to greater mobility and functional control of the lips and tongue in sucking, swallowing, and chewing. The exploration of articulatory contacts in sound play, during and following the meal, was encouraged as improved control of vocalization and freer movement of the tongue, lips, and jaw were observed.

GENERAL PATTERN FOLLOWING 6 MONTHS OF TREATMENT

1. A reduction in the severity of abnormal patterns occured in 17 out of 20 performance areas receiving abnormal scores. In 10 areas, abnormal behaviors progressed from the severe or moderately abnormal to mildly abnormal. In 5 areas the progression was from severe to moderate.

2. Gains of 3 to 6 months were observed in the normal developmental range for 15 performance areas. Greater gains were achieved in the areas of Sucking: Pureed foods from a spoon (13 months) and Respiration-Phonation: Duration (9 months).

3. The greatest overall gains were attained in Sucking: Pureed foods from a spoon (i.e., reduction of the abnormal score from -6 to -1 and increase in the normal range score from 2 months to 15 months).

4. Normal scores of approximately 6 months were received in four of the five Sound Play performance areas, concomitant with a general reduction in abnormal behaviors. Normal behaviors in these areas were not present at a scoreable level prior to treatment.

FIGURE 18.

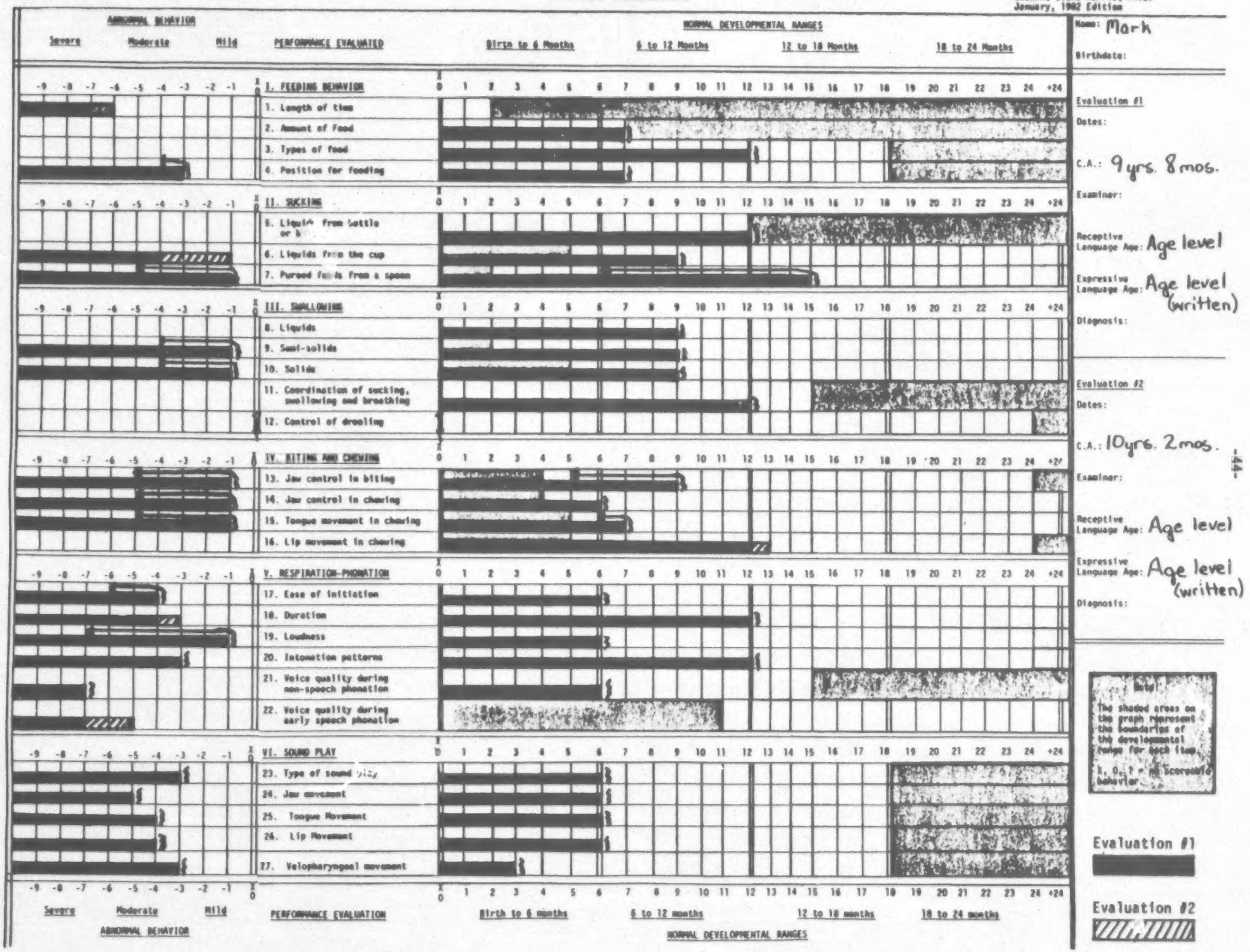

PRE-SPEECH ASSESSMENT SCALE
Suzanne Evans Morris, Ph.D.
January, 1982 Edition
ABNORMAL BEHAVIOR
Severe
Moderate
Mild
PERFORMANCE EVALUATED
NORMAL DEVELOPMENTAL RANGES
Birth to 6 Months
6 to 12 Months
12 to 18 Months
18 to 24 Months
I. FEEDING BEHAVIOR
1. Length of time
2. Amount of food
3. Types of food
4. Position for feeding
II. SUCKING
5. Liquids from bottle or breast
6. Liquids from the cup
7. Pureed foods from a spoon
III. SWALLOWING
8. Liquids
9. Semi-solids
10. Solids
11. Coordination of sucking, swallowing and breathing
12. Control of drooling
IV. BITING AND CHEWING
13. Jaw control in biting
14. Jaw control in chewing
15. Tongue movement in chewing
16. Lip movement in chewing
V. RESPIRATION-PHONATION
17. Ease of initiation
18. Duration
19. Loudness
20. Intonation patterns
21. Voice quality during non-speech phonation
22. Voice quality during early speech phonation
VI. SOUND PLAY
23. Type of sound play
24. Jaw movement
25. Tongue Movement
26. Lip Movement
27. Velopharyngeal movement
PERFORMANCE EVALUATION
ABNORMAL BEHAVIOR
NORMAL DEVELOPMENTAL RANGES
Name: Mark
Birthdate:
Evaluation #1
Dates:
C.A.: 9yrs. 8mos.
Examiner:
Receptive Language Age: Age level
Expressive Language Age: Age level (written)
Diagnosis:
Evaluation #2
Dates:
C.A.: 10yrs. 2mos.
Examiner:
Receptive Language Age: Age level
Expressive Language Age: Age level (written)
Diagnosis:
Note:
The shaded areas on the graph represent the boundaries of the developmental ranges for each item.
X, 0, 1 or 2 will be scored for each behavior.
Evaluation #1
Evaluation #2

FIGURE 18.

Child: Mark

Age: 10 years 2 months

Diagnosis: Athetoid Cerebral Palsy

Receptive Language: Age level

Expressive Language: Age level (written)

SIX-MONTH INTERVAL FOLLOWING INTENSIVE PRE-SPEECH TREATMENT

The 6-month period following intensive pre-speech treatment consisted of 3 months of summer vacation and the initial 3 months of the school year. Treatment during this period was inconsistent and no emphasis was placed on pre-speech development. Mark experienced a wide variety of new feeders during the summer and a noisier and more chaotic eating environment in the school cafeteria. This made it more difficult for him to communicate his mealtime needs and procedures.

GENERAL PATTERN FOLLOWING 6 MONTHS WITHOUT PRE-SPEECH TREATMENT

1. A mixed picture of plateaus and regressive behavior was observed. Mild behavioral gains were observed in only 5 performance areas (i.e. Feeding Behavior: Length of time, Sucking: Liquids from the cup, Biting and Chewing: Lip movement in chewing, Respiration-Phonation: Duration, and Respiration-Phonation: Voice quality during early speech phonation).

2. Although major gains were not observed during this 6-month period, gains achieved during the prior period of intensive treatment were maintained or increased in 17 of the 26 areas scored.

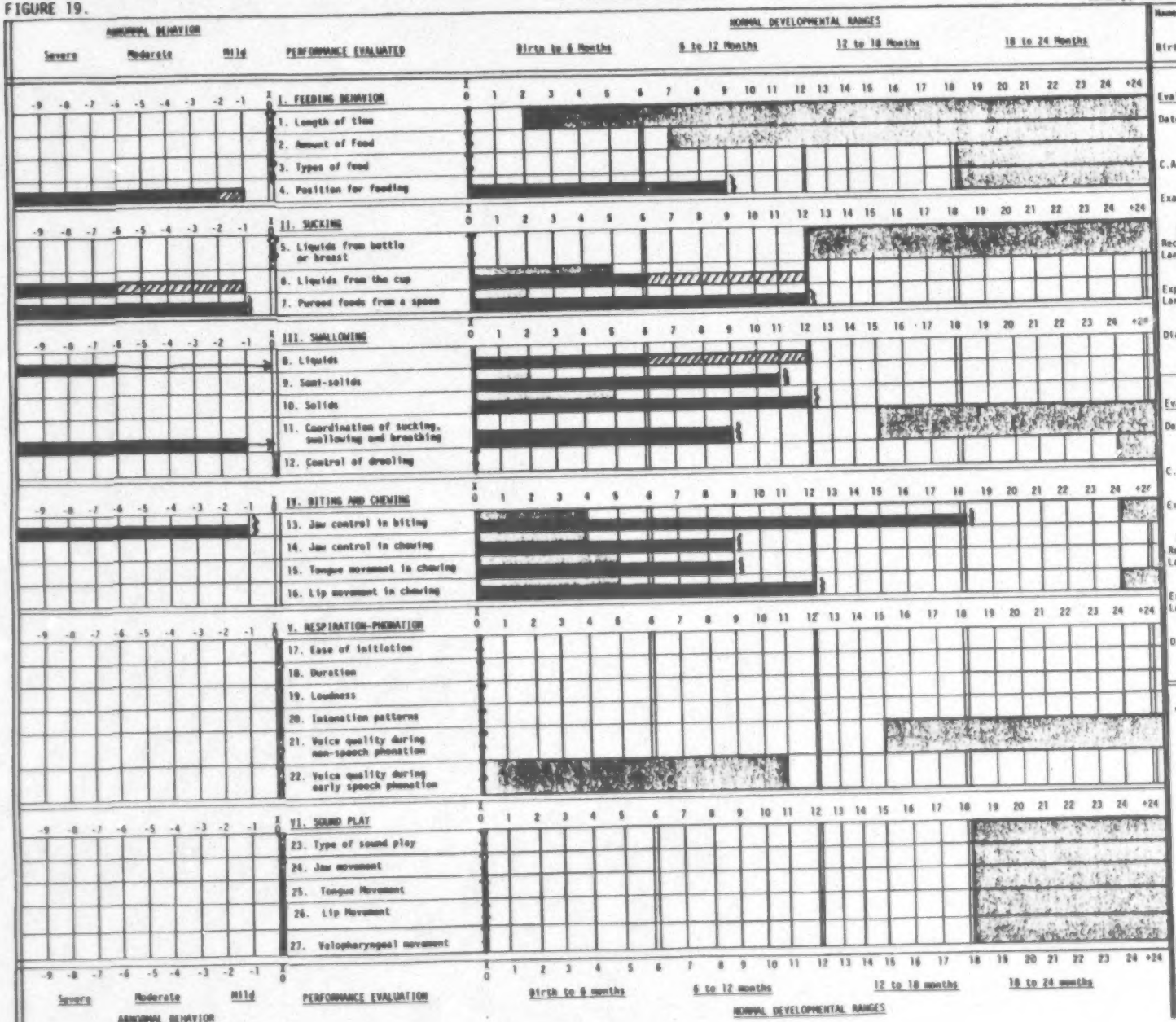
3. Regression to a more abnormal or more delayed level of behavior was seen in 9 areas. However, in only Biting and Chewing: Jaw control in biting was the regression to a more severe or delayed level of function than in the pre-therapy period.

4. The greatest overall loss of proficiency was observed in Sucking: Purreed foods from a spoon. Abnormal behaviors increased from -1 to -5 and normal behaviors regressed from the 15-month level to the 6-month level. This area most clearly reflected the reduced ability to guide the feeder with vocalizations, eye gaze, or mouth cues. When Mark was unable to work cooperatively with the feeder and signal his own readiness and timing needs, it became impossible for him to use appropriate jaw stabilization and lip activity. This loss was undoubtedly related to the increase in unfamiliar feeders and mealtime environments.

FIGURE 19.

PRE-SPEECH ASSESSMENT SCALE

Suzanne Evans Morris, Ph.D.
January, 1982 Edition




Name: Ben

Birthdate:

Evaluation #1

Dates:

C.A.: 2yrs. 3mos.

Examiner:

Self-feeding

Receptive Language Age:

Expressive Language Age:

Diagnosis:

Evaluation #2

Dates:

C.A.: 2yrs. 3mos.

Examiner:

mother feeding

Receptive Language Age:

Expressive Language Age:

Diagnosis:

-46-

Note:

The shaded areas on the graph represent the boundaries of the developmental range for each item.

X, 0, ? = no scoreable behavior.

Self-feeding

Mother feeding

FIGURE 19.

Child: Ben

Age: 2 years 3 months

Diagnosis: Mixed Spastic and Athetoid Cerebral Palsy

Evaluation #1: Self-feeding

Evaluation #2: Fed by Mother

GENERAL PATTERN FOR SELF-FEEDING

1. Abnormal behaviors occurred in 6 of the 11 behavioral areas scored. These were in the mild range of abnormality with the exception of behaviors related to the management of liquids. Sucking: Liquids from the cup and Swallowing: Liquids were scored in the moderate range of abnormality.

2. Normal behavior scores clustered within the 9-12 month range of development. Behaviors related to the processing of liquids (Sucking: Liquids from the cup and Swallowing: Liquids) were at the 6-month level.

GENERAL PATTERN FOR BEING FED BY MOTHER

1. Abnormal behaviors were present in 4 of 11 behavioral areas. Abnormal scores were no longer present for Swallowing: Liquids and for Coordination of Sucking, Swallowing and Breathing when he was fed by his mother. The abnormal score for Sucking: Liquids from the cup was reduced from a moderate abnormality (-6) to a mild abnormality (-1).

2. Normal behavior scores increased from the 6-month level to the 12-month level for Sucking: Liquids from the cup and Swallowing: Liquids.

3. Feeding areas related to spoon feeding of semi-solids and chewing of solid foods were unchanged when the spoon and food were presented by an adult feeder.

RECOMMENDATIONS FOR METHOD OF FEEDING

1. No differences were observed between self-feeding and being fed for tasks involving sucking and swallowing or semi-solid foods from the spoon or chewing of solids. Therefore, development of self-feeding for finger foods and softer foods from the spoon should be encouraged.

2. A difference in both normal and abnormal movements was present for sucking and swallowing liquids from the cup. As this was reflected in an increase in abnormal jaw movements and loss of tongue elevation patterns during sucking and swallowing, self-feeding utilizing the cup is not recommended. Ben should continue to be given liquids from the cup by an adult feeder.

FIGURE 20.

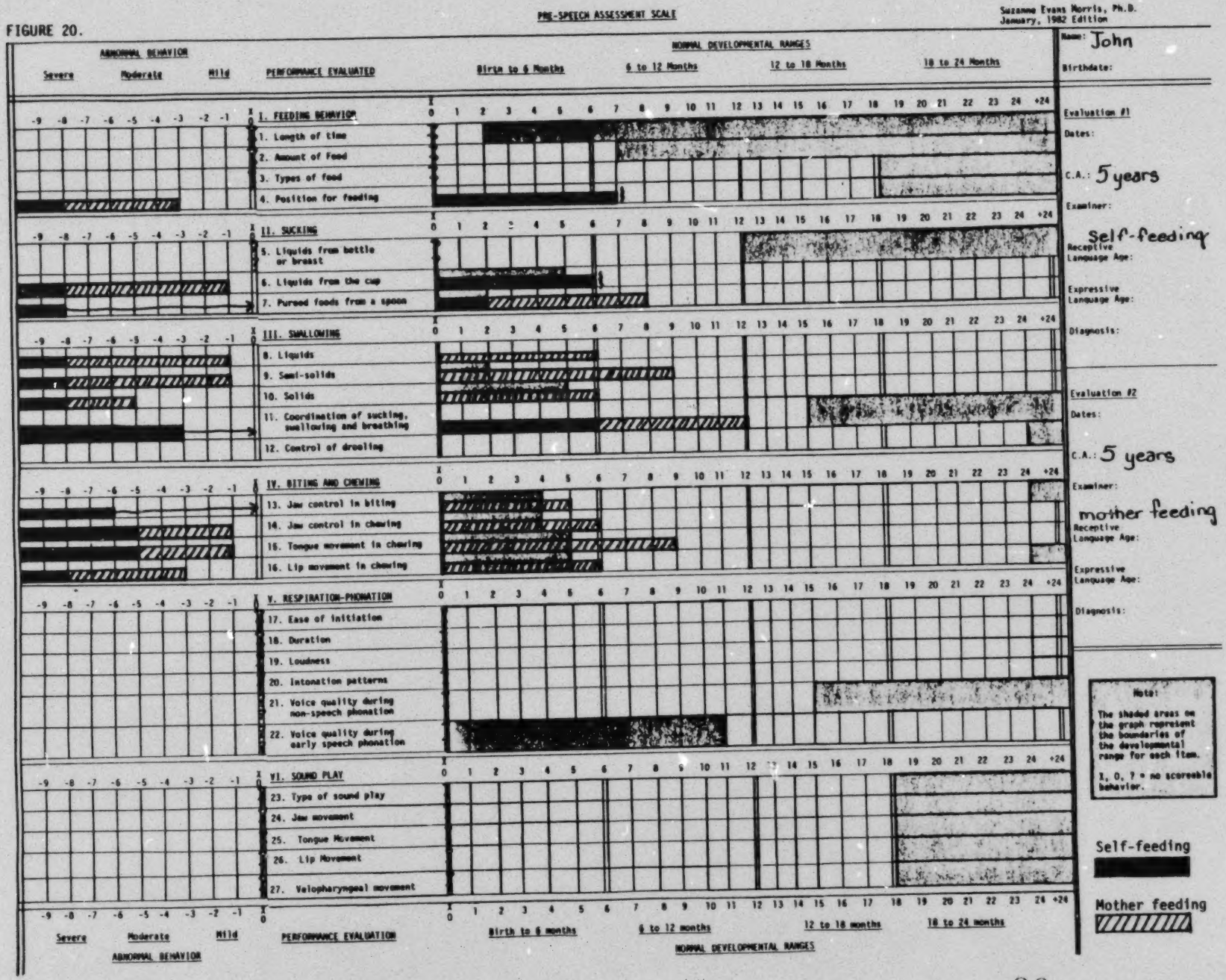

PRE-SPEECH ASSESSMENT SCALE
Suzanne Evans Morris, Ph.D.
January, 1982 Edition
ABNORMAL BEHAVIOR
Severe
Moderate
Mild
PERFORMANCE EVALUATED
NORMAL DEVELOPMENTAL RANGES
Birth to 6 Months
6 to 12 Months
12 to 18 Months
18 to 24 Months
I. FEEDING BEHAVIOR
1. Length of time
2. Amount of Food
3. Types of food
4. Position for feeding
II. SUCKING
5. Liquids from bottle or breast
6. Liquids from the cup
7. Pureed foods from a spoon
III. SWALLOWING
8. Liquids
9. Semi-solids
10. Solids
11. Coordination of sucking, swallowing and breathing
12. Control of drooling
IV. BITING AND CHEWING
13. Jaw control in biting
14. Jaw control in chewing
15. Tongue movement in chewing
16. Lip movement in chewing
V. RESPIRATION-PHONATION
17. Ease of initiation
18. Duration
19. Loudness
20. Intonation patterns
21. Voice quality during non-speech phonation
22. Voice quality during early speech phonation
VI. SOUND PLAY
23. Type of sound play
24. Jaw movement
25. Tongue Movement
26. Lip Movement
27. Velopharyngeal movement
Name: John
Birthdate:
Evaluation #1
Dates:
C.A.: 5 years
Examiner:
Self-feeding
Receptive Language Age:
Expressive Language Age:
Diagnosis:
Evaluation #2
Dates:
C.A.: 5 years
Examiner:
mother feeding
Receptive Language Age:
Expressive Language Age:
Diagnosis:
Note:
The shaded areas on the graph represent the boundaries of the developmental range for each item.
X, O, ? = no scoreable behavior.
Self-feeding
Mother feeding

FIGURE 20.

Child: John

Age: 5 years

Diagnosis: Athetoid Cerebral Palsy

Evaluation #1: Assisted Self-Feeding

Evaluation #2: Fed by Mother

GENERAL PATTERN FOR SELF-FEEDING

1. Abnormal behaviors occurred in each of the 11 performance areas scored. Seven scores were in the severe range of abnormality. Three scores were in the moderate range. One score fell within the mild range.

2. Co-existing normal scores were present in 4 of the 11 categories. These scores fell within a 2 to 7-month range of development.

GENERAL PATTERN FOR BEING FED BY MOTHER

1. Abnormal behaviors occurred in 8 of the 11 performance areas scored. Abnormal behaviors in Sucking: Pureed foods from a spoon, Swallowing: Coordination of sucking, swallowing breathing, and Biting and Chewing: Jaw control in biting were no longer present. Six abnormal scores fell within the mild range of abnormality. One score fell within the moderate range.

2. Normal scores were present in all areas scored. These clustered at the 6-month level, with 3 of the scores falling within the higher 9 to 12-month range.

RECOMMENDATIONS FOR METHOD OF FEEDING

1. Strong differences in oral-pharyngeal control were observed between the two feeding methods. Significant regression in skill was present in all areas of self-feeding.

2. Self-feeding was not recommended. Attempts to teach self-feeding skills at this time could result in loss of many of the more normal oral feeding skills developed during the past 3 years.

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## Summary of Concepts and Procedures Underlying Use of the Pre-Speech Assessment Scale

### Concepts and Usage of the Pre-Speech Assessment Scale

1. The Pre-Speech Assessment Scale was developed to provide a way of evaluating pre-speech development in neurologically impaired children. It can be appropriately used with a wide variety of children with impaired or delayed development in the general areas of oral-motor skills in feeding, respiration-phonation development, and oral-motor skills in sound play. This would include children with cerebral palsy, mental retardation, developmental delays, sensory-integrative dysfunction, dyspraxia, and other of the developmental disabilities. Although the age norms range from 1 to +24 months, the PSAS is not limited to children under 24 months. It may be used quite appropriately with older children who have delays or disabilities of pre-speech development.

2. The PSAS provides a way of simultaneously looking at abnormal behaviors (those not observed in the normally developing infant) and behaviors within the normal developmental ranges of 1 to +24 months.

3. Twenty-seven performance areas within six categories are evaluated. It is felt that the sensory-motor skills represented by these areas contain important components for later development of speech. Thus, they are considered here as pre-speech components.

4. Although specific age norms are provided within each performance area of the PSAS, it is more appropriate to describe a child's development as being within a given 6 month range (i.e., in the 6-12-month range) rather than at a specific month level (i.e., at the 8-month level of development).

5. The evaluation concept is one of measuring the child's capabilities for function and not primarily his or her deficits. Except where stated otherwise in the testing protocols, it is assumed that the behavior which is recorded or measured will represent the child's best abilities in that area.

6. The basic underlying concept that assessment and treatment are interrelated allows the child's behavior to be scored during an evaluation session or in the course of several treatment sessions. The most accurate results are usually obtained when the child is evaluated during two or more consecutive sessions.

7. A pre-speech re-evaluation and scoring with the PSAS should generally be scheduled at 6-month intervals. Depending upon age, rate of progress, and changes in the treatment program, evaluation and scoring may be done more or less frequently.

8. Re-evaluation and scoring with the PSAS should never become a substitute for an ongoing re-evaluation of the child's problems, abilities, and response to treatment. The more systematic evaluation format of the PSAS offers a means of objectively viewing the child's total pre-speech status and building or revising overall treatment goals and priorities.

9. All data from the PSAS can be recorded on a graph designed to provide a referent for comparing the child's problems and levels within each performance area and for comparing developmental trends across categories. Comparisons of two or more evaluation graphs may assist the therapist in making decisions for changing the emphasis of the treatment program, beginning or ending a treatment program, evaluating the effectiveness of special treatment techniques, and determining the appropriateness of a self-feeding program for a child.

### Procedures Involved in the Evaluation

1. An assessment of the child's postural tone and movement patterns and responses to stimulation should always precede the pre-speech evaluation. Information on the child's sensory and motor status should be incorporated into the pre-speech evaluation in order to obtain the child's best performance.

2. Written notations should always be made relating specific aspects of the child's functioning in each of the pre-speech areas. The Pre-Speech Assessment Scale should never be used as an isolated scoring system where the end result of an evaluation is a set of numbers.

3. Information used for scoring the child on the PSAS must come only from the child's or child and parent's unaided performance. The examiner should use positioning and stimulation appropriate for the child. However, specialized techniques of inhibition and facilitation should not be used during or just prior to the evaluation for scoring.

4. The Guiding Questions for the Pre-Speech Assessment provides a listing of the pertinent questions and observations which should be made. It may be an effective format for collecting the data for scoring as the examiner is becoming familiar with the PSAS and its behavioral descriptions.

5. The Pre-Speech Assessment and Summary of Scores form provides a concise format for recording the narrative data on the child and indicating an appropriate set of scores. The face sheet contains a summary of the scores which the child received in all performance areas on the PSAS.

Procedures Involved in Scoring

1. Three categories of scores are used in the Pre-Speech Assessment Scale:

   a. Abnormal behavior score (-) which describes the presence of patterns of tone and movement in the pre-speech areas which are not observed in the normally developing child. These scores range from -1 to -9.

   b. Normal developmental range score (+) which describes the presence of movements or characteristics in the pre-speech areas which are observed in the normally developing child between the ages of 1 and 24 months. These scores range from 1 to +24 months, in monthly increments.

   c. No scoreable behavior (0, X, or ?) which indicates the behavior evaluated is not present due to chronological age, non-neurological reasons, or lack of an adequate sample of a behavior which does exist.

      1.) Score of 0 is given if the child is chronologically below the age when the behavior should first emerge. A score of 0 indicates that the lack of behavior is appropriate to the child's chronological age.

      2.) Score of X is given if the child shows no measurable behavior but is chronologically above the age when that behavior should first emerge. A score of X indicates that the lack of behavior is not due to the child's chronological age nor to the interference of a primary neurological disorder.

      3.) Score of ? is a temporary score given if the child shows no measurable behavior at the time of the evaluation due to lack of cooperation or to the examiner's decision not to observe and score the behavior. A score of ? indicates that the behavior is probably present in a scoreable form, but that inadequate information was provided by the child, therapist, or parent for appropriate scoring.

2. If the behavioral description for a performance area includes alternative behaviors, the letter of the alternate should be placed beside the number (i.e., -4c or -4acd). Letters referring to an appropriate alternative should also be used if the child has been given a clinical judgement score.

3. Scores in the normal developmental range contain the implication that the child who receives a score at a higher level can also meet the criteria for each of the lower level items. For this reason, the higher scores should not be assigned if there are developmental gaps at lower levels of development. In these instances the child should receive the lower score which represents an unbroken continuity of development.

4. The examiner must decide whether the child's lack of behavior is due to a primary neurological pre-speech disorder, or to other behavioral or medical reasons. This will determine whether the child receives a -9, 0, X, or ? for that behavior.

5. In determining eligibility for a 0 score, the child's chronological age may be adjusted for the first 2 years if the baby was premature. Adjustments for prematurity should not be made if the child is older than 24 months or for the overall delays in development seen in mental retardation.

6. The co-existence of both normal and abnormal behaviors within the same performance area is recognized by the PSAS. The child may be given either a double score or a single score depending upon the behavior. If only a single score is given, the other blank or square on the scoring form should be left blank. A double score is given when a child shows both abnormal behaviors and well-established normal behaviors in the same performance area.

7. Negative behaviors are always scored within the abnormal behavior range even if they are infrequent or inconsistently mingled with the emergence of higher level normal behaviors.

8. Normal behaviors must occur at least 75% of the time or present the examiner with the clinical impression of being well-established in order to be scored at the level of the behavioral description.

9. A normal behavior which occurs less than 75% of the time or is not well-established would be considered an emerging behavior. Its presence would provide the opportunity for the use of a clinical judgement score, indicating the ongoing development of more mature behaviors.

10. Clinical judgement scoring is utilized when a child's behavior in a performance area falls somewhere between two of the scores listed for that area. In situations like this, the examiner would use his or her own clinical judgement to assign a score that falls somewhere between the two listed scores.

11. Determination of an appropriate clinical judgement score in the abnormal behavior section is based upon frequency of occurrence and severity of interference. In the normal behavior section, it is based upon the degree of skill and proficiency of the described behavior and upon the presence of emerging behaviors at the higher level.

12. If there is more than one scoring choice for a clinical judgement score, a well-thought-out procedure should be used in assigning a score. This should be based upon the amount of difference or distance from the behavioral descriptions listed and on recognized age norms.

13. The identification of a clinical judgement score should be made on the score sheet by placement of an asterisk (*) slightly above and to the right of the number. The asterisk (*) would also be placed in the body of the recording form next to the more advanced behaviors which influenced the examiner to give a clinical judgement score.

14. In every performance area the -1 score refers to a relatively mild abnormality which probably does not interfere with the acquisition of movement in the pre-speech sequence, but may interfere and become a problem to the child attempting to use these movements for speech production. Guidelines for assignment of a -1 score are provided within each performance area under Specific Scoring Information. A (-1) should be placed in the body of the recording form next to the behaviors which influenced the examiner to give a -1 score.

15. When scores are transferred to the face sheet of the Pre-Speech Assessment and Summary of Scores form, totals should be derived for both negative and positive behaviors in each category. Scores on repeated evaluations may be effectively compared within the same performance area or category. Scores should not be compared across categories since appropriate developmental norms for the numbered totals have not been established.

Procedures Involved in Graphing

1. Scores may be interpreted visually by means of a horizontal bar graph system. Separate, but adjacent graphs are provided for normal and abnormal scores.

2. Shaded areas on the graph represent the boundaries of the developmental range for each item.

3. The solid horizontal bar always begins at the left side of the abnormal section of the graph for abnormal scores and always begins at the left side of the normal section of the graph for the normal scores.

4. If there is no behavior to be graphed, the score is indicated on the graph by placing a small X, O, or ? on the X-O line on both the normal and abnormal sides of the graph.

5. When an area is shaded on the left hand side of the normal development graph, the horizontal bar passes through the shaded area until it reaches the appropriate score.

6. Felt-tipped pens should be used to draw the bars on the graph for each evaluation. The initial evaluation should be coded in black; the re-evaluation should be coded in red.

7. The procedure for graphing re-evaluations is basically the same as graphing the initial evaluation. The horizontal bar is continued where there have been measurable gains. A wavy vertical line is used to indicate a plateau. Regression is indicated by a wavy vertical line at the plateau point which continues to the left as a straight thin horizontal line and ends in an arrow.

## AN APPROACH TO THE EVALUATION OF FEEDING BEHAVIORS

### Basic Concepts

The evaluation of the child's feeding behavior is a measure of the environmental interaction between the child and the feeder. It is an indirect measure of the practical effect of any feeding difficulties on the persons in the child's environment and the ways in which the persons in that environment have attempted to cope with difficulties or differences.

Measures of this interaction include the length of time required to feed the child, the amount of food eaten at a meal, the type of food given to the child, and the position in which the child is fed.

Abnormalities in these areas (such as excessive time required for a meal, inadequate food or liquid intake, need to thicken liquids, or abnormal bodily tension and movement during feeding) create additional stresses and demands upon the persons who must feed the child.

Information for scoring in the subcategories is derived from the Parent Questionnaire with clarifying or supplemental information from direct parental interview. Scoring is based upon the typical features of the child's meals at home. It is not based upon the quality of the child's feeding responses or changes in his responses in a therapy situation.

### Relationship to Pre-Speech and Communication Function

The presence of an abnormally long time to feed the child, inadequate food or liquid intake, and abnormal movement patterns and postural tone during feeding can all affect the interaction of the child and feeder. The caregiver's concern (usually the mother) and anxiety about nutrition, and her attempts to cope with the child's abnormal physical responses can result in a reduction in positive verbal and non-verbal messages to the child. The child feels and senses the mother's frustration, anxiety or anger and may respond with an increase in tension and physical problems during eating. Excessive feeding times reduce the time which the mother has for other family members and herself and may increase a sense of frustration and resentment. These negative messages between child and feeder do not provide a healthy basis for a desire to communicate and interact with another person.

Increases in abnormal postural tone and abnormal body movements frequently increase the difficulty which the child has in controlling and developing appropriate oral-motor patterns during feeding. Abnormal movement patterns of the mouth can be seen as a component of total body patterns of extension, flexion and asymmetry. For example, head and trunk extension are frequently accompanied by an increase in severity or frequency of jaw thrusting and/or lip retraction. The child who shows abnormal positioning during feeding may have little or no opportunity to develop and practice normal movements of the jaw, tongue and lips during feeding.

#1. LENGTH OF TIME REQUIRED TO EAT A MEAL

Testing Procedure

Ask the parent to estimate the length of time usually spent in feeding the child his largest meal of the day. Do not count time that the child takes to feed himself. If the child typically feeds himself, ask the parent to feed him several meals in order to obtain an estimate of the length of time needed to eat a meal when fed by another person. If the parent is unsure, ask that a record of time be kept for one week, and use this information for scoring purposes. The median average should be used. The time needed for both liquid and solids should be combined as one meal if the child is taking both. Scoring should be based on the length of time required for the person who most frequently feeds the child the largest meal of the day. Scoring for a tube fed child should be based on the largest 'meal' or snack given by mouth.

Specific Scoring Information

a) If the parent gives a time range which spans two or more categories (i.e., 40-50 minutes), do not accept this figure. Try to bracket the child's most typical feeding behavior into the ranges included in the scale. If necessary, have the parent time the meals for a week to obtain exact information.

b) If the parent reports a time range which varies depending upon who is feeding the child, the score should be based on the time required with the person who most frequently feeds the child the largest meal, i.e.: the child eats in 40 minutes for the mother; he eats in 20 minutes for the father. Mother feeds the meal more than 50% of the time. The child would receive a score of -3 based on mother's time.

c) If the parent reports a time range which varies depending upon the position used for feeding, the score should be based on the time required in the position most frequently used for the meal being scored. For example, a child requires 25 minutes when fed in a prone position but 45 minutes when fed in a sitting position. The sitting position is used more than 50% of the time. A score of -6 would be given, because of the greater frequency of the sitting position. Prone feeding is used for only one meal per day (i.e. 33% of the time).

d) If the parent reports a time range which varies depending upon the type of food given the child at the meal, the score should be based on the time required for the food most frequently used during the meal being scored. For example, a child requires 20 minutes for pureed food but requires 40 minutes when chopped table foods are given. Solid foods have just been added to his diet and are not frequently given at the largest meal. Thus, a score of 2 months should be given.

e) If the child receives some food by tube feeding and some food orally, scoring should be based on the largest "meal" taken orally. This meal can be a snack with a relatively small intake and does not have to be a full meal in the normal sense.

f) It is important to differentiate behavioral from physical reasons for an unusually long feeding time. When the parent states that feeding requires more than 30 minutes, this figure should be carefully explored. How much of that time is involved in playing with the child? In allowing the child to be by himself to rest or settle down? Are these non-eating components of the meal included for the feeder's pleasure or enjoyment, or are they done to obtain a more normal sensory or physical basis for the child's improved eating? If the play time is included for the child's and feeder's enjoyment and is not felt to be a necessary step in improving the child's eating abilities, it should not be included in the time figure used in scoring. If the time spent in playing with or diverting the child or calming him down are felt to be necessary in obtaining a better or more cooperative eating pattern, the total time figure should be used in scoring.

g) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of the length of time required to eat a meal which could be scored as -1 would include: extreme variations in the length of time related primarily to behavioral difficulties involving power struggles or attention-getting mechanisms; consistent variation in feeding time between 30 or 40 minutes and a time less than 30 minutes; times of less than 10 minutes.

h) Guidelines for Use of the Clinical Judgement Score: Factors to consider when scoring a child between categories would include: the actual amount of time required to feed the child and the amount of variability in feeding times.

#1. LENGTH OF TIME REQUIRED TO EAT A MEAL

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child takes no liquids or food by mouth due to a primary sucking or swallowing disorder. |
| -8 | More than 90 minutes |
| -7 | 60 - 90 minutes. |
| -6 | 45 to 59 minutes. |
| -3 | 30 to 44 minutes |
| -1 | The length of time required to eat a meal shows unusual or mildly abnormal components not previously described; or the abnormal time patterns described above occur with extremely low frequency or when the child is under stress or ill. |
| X | The child does not take liquids or food by mouth due to gastro-intestinal disorders, structural disorders, delayed oral development due to prematurity, or other medical or behavioral reasons not related to a primary sucking or swallowing discorder. |
| 2 months | Less than 30 minutes |

#2. APPROXIMATE AMOUNT OF FOOD EATEN AT A MEAL

Testing Procedures

Ask the parent to estimate the number of ounces of food and liquid served to the child for the child's largest meal. Visualizing the number of jars of strained food which would be given (a jar contains 4½ ounces) or which would be filled with table food helps obtain a more realistic estimate. Or ask the number of tablespoons of solid food served to the child. One ounce is equal to two tablespoons. In a hospital setting intake may be measured in cc units. One ounce is equal to 30 cc. If the child loses a great deal of food because of poor tongue and lip control, the parent should be asked to obtain an exact measure for several days. The following procedure should be used: measure the food served in a measuring cup which indicates the number of ounces served. Place a plastic bib with a pocket at the bottom around the child's neck. After feeding the child, pour any food or liquid remaining in the dish, cup, or pocket of the plastic bib into the measuring cup. Subtract the amount not eaten from the amount served to obtain the number of ounces actually consumed by the child. Scoring should be based on the amount of food usually consumed for the person who most frequently feeds the child the largest meal of the day. Scoring for a tube-fed child should be based on the largest 'meal' or snack given by mouth.

SPECIFIC SCORING INFORMATION

a) In most instances the estimate will be in round numbers since most parents will not measure the exact amount served. If, however, the total figure includes a fraction of an ounce, a score equivalent to the smaller whole number should be used. For example, 8½ ounces should receive a score of 3, not 5.

b) If the child is a profuse drooler during feeding, the amount of food lost may appear to be large. If the child is on fairly solid food, the excess saliva can be poured out of the bib before measuring the amount of food not eaten. If the child's saliva mixes with liquids or strained foods, it may be extremely difficult to obtain an accurate estimate of the amount of food consumed. The examiner should, in this instance, measure the total amount of food, liquid, and saliva in the bib. This amount should be used as the constant figure for the amount not eaten. A notation should be made of the situation on the comment section of the evaluation form. Any future gains in oral control or swallowing should result in a reduced amount of food and saliva lost.

c) If the parent reports an amount of food which varies depending upon who is feeding the child, the score should be based on the amount consumed for the person who feeds the child the largest meal of the day; i.e., the child generally eats 2 ounces for the father and eats 4 ounces for the mother. Mother feeds the meal more than 50% of the time. The child would receive a score of 1 based on mother's amount.

d) Some children may meet the requirements for food and liquid intake in the normal range (i.e., 4 to +11 ounces) yet still have extreme difficulties in taking liquids so that all or nearly all of the intake is in the semi-solid or solid food categories. This is not a normal situation and should not be classified only in the normal area.

If the combination of the child's liquid and food intake is 4 ounces or more, the liquid intake should be at least 2 ounces for a child under 6 months. If liquid intake is less than 2 ounces and food intake brings the total intake to 4 ounces or more, the child should receive a score of -3a. If the child is older than 6 months a score of -3a should be given if liquid intake is less than 4 ounces. In both instances, if there are no physical difficulties with liquids and the child is just in a developmental stage of refusing liquids, he or she should not be penalized and scored in the abnormal range. If liquids are taken at a separate time of day from food, and if liquid intake seems adequate, he or she should not be penalized and scored in the abnormal range.

In the double scoring system, each of these children would also receive a score in the normal range indicating that their total intake was at least 4 ounces.

e) If the parent reports an amount of food which varies depending upon the position in which the child is fed or the type of food being given, the score should be based upon the most frequent situation for the meal being scored. For example, a child takes 12 ounces of food when fed pureed foods in a supine position. This is used when the parent is in a hurry. For the majority of meals the child receives ground table foods and is fed in a supported sitting position. Intake at this time is usually 8 ounces. A score of 3 would be given to represent the feeding situation which occurs more than 50% of the time.

f) If the child is breast fed, it is not possible to calculate the amount of liquid directly. If weight gain and nutrition are adequate, a score equivalent to the chronological age should be given to the infant between 0 and 5 months. If the infant is 6 months or older, the amount of liquid intake should be calculated as 8 ounces.

g) Guidelines for Use of the -1 Score: Some of the mildly abnormal components of the amount of food eaten at a meal which could be scored as -1 would include: extreme variations in the amount of food eaten related primarily to behavioral difficulties involving power struggles or attention-getting mechanisms; consistent variation in intake amount between 4 ounces and 2-3 ounces.

h) Guidelines for Use of the Clinical Judgement Score: Factors to consider when scoring a child between categories would include: the actual amount of food which the child consumes and the amount of variability in intake.

#2. APPROXIMATE AMOUNT OF FOOD EATEN AT A MEAL

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child takes no liquids or food by mouth due to a primary sucking or swallowing disorder. Child is on tube feeding for all meals. |
| -8 | Takes 1 to 2.9 ounces of food and liquid. |
| -6 | Takes 3 to 3.9 ounces of food and liquid. |
| -3 | a. Takes an adequate amount of semi-solid or solid foods, but liquid intake is inadequate for chronological age due to physical difficulties with liquids.<br>OR<br>b. Semi-solid or solid intake is inadequate or inappropriate for chronological or developmental age due to physical or behavioral difficulties with semi-solids or solids. |
| -1 | The amount of food eaten at a meal shows unusual or mildly abnormal components not previously described; or the abnormal eating patterns described above occur with extremely low frequency or when the child is under stress or ill. Reduction in the amount of food intake at these times is associated with physical coordination problems and not with loss of appetite due to illness. |
| X | Child does not take liquids or food by mouth due to gastro-intestinal disorders, structural disorders, delayed oral development due to prematurity, or other medical or behavioral reasons not related to a primary sucking or swallowing disorder. |
| 1 month | Takes 4 to 6 ounces of food and liquid. |
| 3 months | Takes 7 to 8 ounces of food and liquid. |
| 5 months | Takes 9 to 10 ounces of food and liquid. |
| 7 months | Takes 11 or more ounces of food and liquid. |

#3. TYPES OF FOOD EATEN BY MOUTH

Testing Procedures

Ask the parent for detailed examples of foods the child will eat. Use follow-up questions to ascertain the consistency of the food and how the child handles it. Scoring is based upon the inclusion of the specified foods at the child's regular mealtimes. Foods eaten while the child is being assisted with jaw control or special positioning may be scored if they are included in the regular diet. Scoring for the tube-fed child should be based on the most typical oral feedings which the child receives.

Specific Scoring Information

a) Thin liquids refers to liquids such as water, milk or juice.

b) Thickened liquids refers to liquids thickened with cereal, pureed fruit, or other substance which makes them less fluid.

c) Pureed food refers to solid foods which have been blended, strained or pureed so that they are smooth but thick. All of the strained commercial baby foods fall into this category. Puddings, custards, yogurt, applesauce, and other "adult foods" would also be categorized here.

d) Ground or junior foods refers to solid foods which have been passed through a food grinder or have been blenderized to the point where they retain small lumps. Many of the junior commercial baby foods fall into this category. However, junior fruits and many junior vegetables are more the consistency of pureed foods. These should be included in the pureed food category. Because of the early age at which they are introduced, cookies would be classified as a junior food.

e) Mashed table foods refer to table food which has been mashed with a fork or cut into pieces which are approximately 1/8 inch in diameter.

f) Coarsely chopped table foods refers to table food which has been cut into pieces 1/4 inch or larger.

g) In order to receive a score of 6, 12 or 18, the child must eat the type of food specified at regular meals. A variety of foods from the specified category should be eaten; for example, a child who is given a cookie but eats strained fruits, vegetables and meats would be given a score of 2, not a score of 6. The child who eats strained foods and mashed potatoes would not receive credit for mashed table foods. A score of 2 would be given in this instance. The ability to handle a more advanced food consistency during therapy only would not entitle the child to receive a higher score.

h) Cereal or fruit will occasionally be added to the child's milk to delay the onset of spoon feeding, and make the addition of some semi-solids easier for the parent and child. Determine whether the thickening of the milk is done because the child has difficulties when the milk is thin, or whether it is done to make the addition of solids easier. Where the child appears to have difficulty with the thinner liquid, abnormal scores of -6a to -5a would be given. If no physical difficulties with thin liquids are observed, the child would receive a score of 1. A child might receive both abnormal and normal scores if liquids were thickened only part of the time.

i) The child's proficiency in handling various types and consistencies of food does not enter into the scoring. Scoring is based on the parental report of the types of food typically given at mealtimes.

j) The child should be given a variety of foods within a category but it is not necessary that he or she be given all of the foods which could fall within the category.

k) It is recognized that the age of introduction of semi-solid and solid foods will vary considerably in the normal infant depending upon parental and pediatrician preferences. For example, pureed food may be introduced as early as 1 week or as late as 6 months. The ages given represent an early average figure. If semi-solids are not added to the diet prior to 6 months, a score between 1 and 5 months equivalent to the child's chronological age should be given. If solids are not added to the diet prior to 9 months a score equivalent to the chronological age should be given. These adjustments should be made only when the later age is based on dietary preference and not related primarily to physical or mental delay or deficit.

l) If the child is tube fed or must have the consistency of the food or liquid thickened or thinned, a score within the abnormal range should be given. However, small oral meal-times may be included for many children who are typically tube fed or in need of modifications in food consistency. If oral feeding of food of a more normal consistency is given regularly at a meal or snack time, the child should be double scored and receive a score in the normal range which represents the type of food regularly given.

m) Guidelines for Use of the -1 Score: Some of the mildly abnormal components of the types of food eaten by mouth which could be scored as -1 would include: extreme variations in the types of food eaten related primarily to behavioral difficulties involving power struggles or attention-getting mechanisms.

n) Guidelines for Use of the Clinical Judgement Scores: Factors to consider when scoring a child between categories would include: frequency of tube feeding, frequency of thickening or thinning the normal consistency of foods, and the variety or number of different types of foods within a category.

#3. TYPES OF FOOD EATEN BY MOUTH

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child is given 75% to 100% of the meals by tube feeding due to a primary sucking or swallowing disorder. |
| -6 | Is given at least 75% of the meals orally. May get supplemental tube feedings or take all liquids by tube. Has difficulty with liquids and may not take thin liquids.<br>a) Is given thickened liquids.<br>OR<br>b) Is given semi-solids or solids only because of physical or behavioral difficulties in handling liquids. |
| -3 | Is given at least 75% of the meals orally. May get supplemental tube feedings. Is able to handle liquids and semi-solids or solids orally but semi-solids may be altered to change consistency. The child takes a minimum of 2 ounces of thin liquids during at least one feeding.<br>a) Takes liquids and pureed foods which have been thinned with additional liquid.<br>OR<br>b) Takes liquids and pureed foods which have been thickened.<br>OR<br>c) Takes liquids and solids only. Does not take pureed foods because of physical or behavioral difficulties in handling soft, smooth foods. |
| -1 | The types of food given to the child show unusual or mildly abnormal components not previously described; or the abnormal patterns described above occur with extremely low frequency or when the child is under stress or ill. Changes in the type of food given at these times is associated with physical coordination problems and not with dietary changes for gastro-intestinal reasons. |
| X | Child does not take liquids or food by mouth due to gastro-intestinal disorders, structural disorders, delayed oral development due to prematurity, or other medical or behavioral reasons not related to a primary sucking or swallowing disorder. |
| 1 month | Is given liquids only from the bottle or breast. |
| 2 months | Is given thin liquids and pureed food which has not been thickened or thinned with additional liquid or solids. |
| 6 months | Is given liquids, pureed foods, ground or junior foods, or mashed table foods which have some small lumps. Has no physical or behavioral difficulty with strained or pureed foods which prevent these from inclusion in the diet. |
| 12 months | Is given liquids and coarsely chopped table foods. These include vegetables, fruits, and easily chewed meat such as hot dogs, luncheon meat, chicken, fish or hamburgers. Chunks of cheese, soy burgers, baked tofu or foods of similar consistency are included if a vegetarian diet is given. Has no physical or behavioral difficulty with soft, smooth foods which prevent these from inclusion in the diet. |
| 18 months | Is given liquids and coarsely chopped table foods. These include fruits, vegetables and all meats, including more difficult meats such as beef, steak, pork chops, etc. Raw vegetables, dried fruits and foods of similar consistency are included if a vegetarian diet is given. |

#4. POSITION IN WHICH THE CHILD IS FED

Testing Procedure

Ask the parent to demonstrate the position typically used for feeding the child by mouth or by tube feeding. Observe whether adaptations are made in handling or positioning of the child to accomodate for problems with postural tone or movement. If a specialized technique such as jaw control is used, ask why and how well it works. Ask whether the child's behavior in responding to positioning and handling is similar to what occurs at home. Ask whether there is a great deal of variability in toleration of positioning and handling during feeding. Observe the child with the type of food which is usually eaten at meal times. Scoring should be based on the position used for at least one meal per day rather than on therapy modifications.

Specific Scoring Information

a) An abnormal position is defined as any position in which the child shows abnormalities of postural tone or movement patterns.

b) Abnormal postural tone and movement patterns is defined as postural tone and movement patterns characteristic of abnormal reflexes. Abnormal postural tone would include hypertonicity (stiffness), hypotonicity (floppiness) and fluctuations in tone from hypotonic to normal or hypertonic, or from normal to hypertonic or hypotonic. Abnormal reflex patterns would include all stereotyped patterns of movement which cause a child to stiffen or move in fairly predictable abnormal ways. These would include movement patterns such as extension or flexion of the head, trunk, arms, or legs; abduction or adduction of the arms or legs; internal rotation of the legs and arms; strong fisting of the hands; asymmetries of the body triggered by turning the head, etc. These would be limited to those patterns of the total body which might influence function of the oral mechanism. Simply the presence of a jaw thrust, tongue thrust or other abnormal pattern of the mouth would not be classified as an "abnormal movement pattern" unless it was accompanied by abnormalities of tone and movement affecting other parts of the body.

c) Adaptations in positioning and handling are defined as any modifications of positioning of the lap, infant seat, high chair, wheelchair, etc., which have the purpose of reducing the influence of abnormal postural tone and movement patterns or postural instability. This would include handling procedures such as increasing hip flexion, inhibiting shoulder retraction, pressure on the sternum to decrease trunk extension, etc. It would also include modification in a chair or wheelchair. This would include the use of ties to keep the legs in abduction, rolls of towels in an infant seat to keep an older infant from falling to one side or to prevent head turning to one side, and other semi-permanent or permanent modifications of the chair and table which might improve the child's overall physical functioning.

d) Effectiveness of adaptations in positioning and handling is judged by the extent to which the instability, and/or abnormal tone and movement patterns are reduced. Judgment should be particularly based on the reduction in sudden or strong changes in tone or movement rather than just on resting tone. Realistically, a hypotonic child will remain somewhat hypotonic throughout the meal. However, handling may reduce or eliminate the presence of sudden or typical head extension or total extensor spasms which would affect the oral mechanism. The direct or indirect effect on the oral mechanism and on interaction/communication with the feeder is the primary consideration for scoring.

e) Since the normal infant will use associated movements of total flexion of the arms and fisting of the hands during the early portion of a feeding session, the age of the child should be considered in judging the presence of abnormal tone and movement. If the child is under 6 months of age, the presence of mild to moderate flexion in the arms and shoulders should not be scored in the abnormal range.

f) A distinction must be made between physical and behavioral needs for external trunk support. The normal infant and/or older hyperactive child with adequate trunk support and sitting balance is frequently restrained with a harness or tray to prevent standing up or climbing out of the high chair. If the child has good trunk support and is sitting independently in other situations a score of 9 should be given even if a restraint is used. If the child is not yet sitting independently or does not appear to have good trunk support, a score of 7 should be given if a restraint is used. If the child is past the age of 18 months and has well-established sitting balance, a score of 18 months should be given when the high chair is used primarily for convenience or safety.

g) The child should not be given an abnormal score if abnormal tone and movement patterns are an atypical response related to the communication of dislike. Often, a normal infant or a cerebral palsied child will extend or pull into flexion in order to avoid being fed a specific food, or as a way of indicating not wanting to eat at all. This must be taken into consideration in scoring. If the response appears to be behavioral, ask the parent if this is typical at home and for how much of the meal. If the child typically or very frequently shows this kind of behavior as a way of saying "no", the behavior should be scored in the abnormal range. If the behavior does not typically occur throughout the meal, a normal score is given if no other abnormal responses are present.

h) Occasionally, variations in the presence of abnormal positions and/or the effectiveness of adaptations used will occur. Determine how much variation there is and score the child on the basis of the most typical situation which is reported by the parents or observed directly.

i) Guidelines for Use of the -1 Score: Some of the mildly abnormal components of positioning for feeding which would be scored at -1 would include: consistent mild increases in tone on the hemiplegic side, mild low tone in a fully supported trunk or neck.

j) Guidelines for Use of the Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: frequency in use or successful use of adaptations in positioning; frequency in the use of more advanced normal positions at different meals.

#4. POSITION IN WHICH THE CHILD IS FED

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child is fed in an abnormal position involving abnormal postural tone and movement. The feeder makes few or no adaptations in positioning and handling to reduce the effects of abnormal tone and movement during feeding. |
| -6 | Adaptations in positioning and handling are made by the feeder to reduce the effects of abnormal tone and movement during feeding. These adaptations are only partially effective and the child reverts to the abnormal position or movement pattern throughout the meal. Tension or abnormal patterns are increased in the oral area; or feeding movements increase tension and abnormal movement patterns in other parts of the body. |
| -3 | Adaptations in positioning and handling are made by the feeder to reduce the effects of abnormal tone and movement during feeding. These adaptations are effective throughout the meal. The child shows few or no instances of abnormal postural tone and movement which would influence the oral mechanism and feeding skills. Feeding movements do not increase tension and abnormal movement patterns in other parts of the body. |
| -1 | The position in which the child is fed involves mildly abnormal components not previously described; or the abnormal patterns described above occur with extremely low frequency or only when the child is under stress or ill. |
| X | The child does not take food or liquid by mouth, or tube feedings. Nutrition is provided intraveneously. |
| 1 month | Child is fed in one or more of the following positions<br>a) Supine with the head slightly elevated.<br>OR<br>b) Prone.<br>OR<br>c) Reclining at an angle of less than $45^{0}$.<br>OR<br>d) Side-lying. |
| 3 months | Child is fed in a supported semi-sitting position on the parent's lap or in an infant seat reclining at an angle of $45^{0}$ to $90^{0}$. |
| 7 months | Child is fed sitting in a high chair, feeding table, infant seat or special chair with the seat and back at an angle of $90^{0}$. Upright sitting on the floor or kneel-standing with assistance with trunk support may be used as the primary position. External trunk support is provided by a restrainer, pillows or tray used primarily for support, or a person. |
| 9 months | Child is fed sitting in a high chair, feeding table, or special chair with the seat and back at a $90^{0}$ angle. The child does not need external trunk support, but needs the physical security of a high chair. |
| 18 months | Child is fed sitting unsupported in a regular child's straight chair or a booster chair placed in the adult chair at the table. The child is able to sit without external back support. The high chair may continue to be used at home or in situations where it provides behavioral restraints or parental convenience. |

## AN APPROACH TO THE EVALUATION OF SUCKING BEHAVIORS

### Basic Concepts

Sucking behaviors are among the first to appear pre-natally. The full-term neonate exhibits a strong, rhythmical sucking pattern within hours after birth (longer if the effects of medication must wear off). Rhythmicity is one of the key features observed in the sucking categories. Initially the movement patterns are rhythmical and involve total simultaneous involvement of jaw, tongue and lips. Over time, one sees the emergence of independent and separated movements of lip, tongue and jaw.

The evaluation, therefore, is designed to explore the manners in which the child handles aspects of initiation, rhythm, and separation of movement. As the process becomes less automatic and more integrated with volitional components, the descriptive term sucking-behavior becomes less appropriate. One might describe the behaviors observed with a cup and with a spoon as being drinking and food intake behaviors rather than sucking behaviors. However, the term sucking has been retained for these categories to show their continuity with the earlier more automatic or reflexive patterns. The examiner should keep in mind that the term, sucking, within the Pre-Speech Assessment Scale describes the process of intake of liquids and semi-solid foods.

### Relationship to Pre-Speech and Communication Function

Relationships between sucking behaviors and speech development are only speculative. The basic rhythmicity of segments of sucking behaviors may be reflective of the basic driving rhythms of the system. These same rhythms appear to have an influence upon the basic rhythmicity of speech production.

Sucking patterns appear to provide a great deal of experience with the closing or valving of various parts of the oral tract. Many of these valvings are those which appear in speech production in the form of place and manner of articulation. For example, the rapid closure and release of the front of the oral tract is necessary in providing stop or plosive consonants. When the closure or valving is achieved with the lips (as often seen in spoon feeding), the place of closure is the same as that observed in bilabial consonants such as, /p/ and /b/. When the closure is with the front of the tongue the place of closure is the same as that observed in the sounds /t/ and /d/. The drawing in of the lower lip for cleaning is similar to the movement and position observed in the sounds /f/ and /v/.

The development of separation of lip and tongue movement from jaw movement depends upon the ability to stabilize the jaw. The process of developing jaw stability is clearly observed in all aspects of sucking. There appears to be a gradual reduction in the extent of the downward excursion of the jaw during sucking from the bottle and breast. The momentary inhibition of jaw and tongue movements as the spoon approaches the mouth provides the stabilization needed for the upper lip to separate and move in a forward and downward direction. The development of jaw stabilization during cup drinking is of primary importance. It appears to be a developmental pre-requisite in the development of independent tongue tip elevation.

The separation of more rapid, precise tongue and lip movements from the jaw is critically important in speech production. The development of rapid elevation of the front or tip of the tongue is characteristic of approximately 80% of connected speech.

MOVEMENT CHARACTERISTICS OF THE TONGUE DURING SUCKING ON A CONTINUUM OF NORMAL TO ABNORMAL

| Characteristics of Tongue and Movement | Sucking | Suckling | Exaggerated Tongue Protrusion | Tongue Thrust |
|---|---|---|---|---|
| Configuration | Flat, thin, slightly bowl-shaped. | Flat, thin, bowl-shaped. | Flat, thin, bowl-shaped.<br>or<br>Thick and slightly bunched. | Thick, bunched. |
| Direction of Movement | Up-down movement on a vertical plane. | Extension-retraction; in-and-out movement on a horizontal plane. | Extension-retraction; in-and-out movement. May show some lateral deviation. | Extension-retraction; Primary movement is outward extension; may show some downward movement of front of tongue or lateral deviation. |
| Range of Movement | From mandible to the anterior hard palate. | Extension or protrusion no further than the middle of lips. | Protrusion phase is exaggerated. Tongue protrudes beyond the borders of the lips. | Protrusion between the gums and usually beyond the borders of the lips. |
| Strength or Force of Movement | Non-forceful; easy upward movement. | Non-forceful; Easy, normal strength of protrusive movement. | Non-forceful. Normal strength of protrusion<br>or<br>Strength may be a bit weak due to hypotonia. | Forceful. Strong protrusion. Muscle tone is frequently hypertonic. |
| Speed or Velocity of Movement | Normal speed (i.e. approximately 1 up-down cycle per second.) | Normal speed of movement (i.e., approximately 1 extension-cycle per second.) | Normal speed;<br>or<br>Slightly rapid movement on extension phase. | Slow movement if there is hypertonicity;<br>or<br>Sudden rapid protrusion. |
| Timing or Rhythm of Movement | Movement is rhythmical; appears to have equal time for up and down portions of cycle.<br>or<br>Slightly greater time duration on downward phase drawing liquid in. | Movement is rhythmical; appears to have equal time for extension and retraction portions of the cycle.<br>or<br>Slightly greater time duration or stress on retraction or "in" phase. | Movement is rhythmical; appears to have equal time for extension and retraction portions of the cycle.<br>or<br>Slightly greater time duration or stress on protrusion or "out" phase. | Movement is usually not rhythmical;<br>or<br>Rhythm is unsustained or broken by the force or speed of the protrusion. |
| Degree of Normalcy of Movement | Normal movement pattern of later infancy and adult. | Normal movement pattern of early infancy. | Mildly abnormal. | Moderately to severely abnormal. |

## II. SUCKING

### Common Definitions

The following definitions of terms apply to all or most of the categories in the Sucking Section. For purposes of conservation of space and increased clarity, they will be provided for the examiner only at the beginning of this section.

a) Tongue thrust is defined as a forceful protrusion of the tongue from the mouth. It is seen as a stronger movement than the extension-retraction movements seen in either the infantile suckling pattern or the mildly abnormal exaggerated tongue protrusion. It is frequently arrhythmical or its intermittent occurrence breaks a previously sustained rhythm. The thrusting of the tongue may make it difficult to insert the nipple or spoon into the mouth or may cause it to be ejected during feeding. During cup drinking the tongue may thrust strongly into the cup itself or may protrude in a very tight fashion beneath the cup or may push the cup away from the mouth suddenly.

b) Jaw thrust is defined as a strong downward extension of the lower jaw when the bottle, cup or spoon is presented for sucking or is already in the mouth. The strength and tension and frequent loss of the nipple, edge of the cup or spoon assist in identifying the jaw thrust. The jaw thrust must be differentiated from the normal full opening of the jaw which often occurs in young infants. This normal lack of fine jaw grading in infants occurs only when the food is presented; the jaw thrust can occur while the food or liquid is being handled in the mouth as well. The jaw may appear to be stuck in the open position and the child may have difficulty closing the mouth to initiate a suck. The jaw thrust must also be differentiated from a pattern of inefficient or unsustained sucking in which up-and-down movement of the jaw may be too great.

c) Lip retraction and/or purse-string action of the lips is defined as the drawing back of the lips so that they form a tight horizontal line over the mouth. In this position it becomes difficult for the lips to assist in sucking from the bottle or cup and to assist in removing food from the spoon. The purse-string action of the lips appears to be a compensation for lip retraction in many children. The child counteracts the basic tendency toward retraction (i.e., an extensor movement) by pursing or pulling forward of the lips (i.e., a flexor movement). The result appears as if the orbicularis oris muscle encircling the lips is being contracted or drawn closed in a manner resembling the draw-string often used to close a cloth purse or laundry bag.

d) Tongue retraction is defined as the strong pulling back of the tongue into the pharyngeal space. The tip of the tongue is not even with the gums or in approximation with the lower lip as it would be in the normal infant. It is often pulled back toward the middle of the hard palate and may be in firm approximation with the hard or soft palate.

e) The Bite Reflex is defined as the rhythmical closing and opening of the jaws when the gums or teeth are stimulated. This may take the form of an easy phasic bite with a slight chewing motion during stimulation, or of a strong tonic bite. In the tonic bite reflex the jaw closes strongly with stimulation and often does not open easily.

f) Jaw clenching is defined as the tight, involuntary closure of the jaw making jaw opening difficult. It is important to determine that the clenching movement is not just the child's behavioral way of refusing food. Often the difficulty with mouth opening is related to excessive flexor tone throughout the body or to self-stimulation of a tonic bite reflex.

g) The normal cupped configuration of the tongue occurs primarily during the suckling phase of feeding development. It is defined as a tongue that is thin and semi-bowl-shaped as it moves forward and backward in the suckling action or remains thin, flat and slightly depressed during true sucking.

h) Exaggerated tongue protrusion is defined as an extension-retraction movement pattern which has an exaggerated amount of protrusion. The tongue generally moves beyond the borders of the lips. It is similar to the suckle pattern in its rhythmicity and strength of movement. It, however, contains abnormal components in common with the tongue thrust. These may include thickness or bunching of the tongue, lateral deviation, and rapid or exaggerated protrusion. Exaggerated tongue protrusion does not have the forcefullness or the breaks in rhythm generally seen in a true tongue thrust.

i) Suckling is defined as the early infantile method of sucking which involves a definite extension-retraction movement of the tongue. Liquid or soft food is obtained through a rhythmical licking action of the tongue combined with strong jaw opening and closing. There is frequently a rather loose approximation of the lips. Protrusion of the tongue is not beyond the borders of the lips.

j) Sucking is defined as the rhythmical method of drawing soft food or liquid into the mouth with a negative pressure component. Tongue action is primarily a raising and lowering of the body of the tongue and action of the intrinsic muscles. A greater amount of tongue tip elevation is observed. There is less jaw movement than in the suckling pattern. Negative pressure builds up within the mouth due to firmer approximation of the lips. This works to pull soft food and liquid into the mouth.

k) Hypotonia is defined as a reduced amount of tone or resting tension in the muscles of the tongue, lips or cheeks. When tone is abnormally low, movement abilities may be impaired.

#5. SUCKING: LIQUIDS FROM THE BOTTLE OR BREAST

Testing Procedures

Observe the child with the bottle or breast if liquids are given in this manner at any time during the day. The child should be observed and scored even if liquids are also given by cup. A tube-fed child should also be tested and scored. The nipple should be removed and reinserted into the mouth at least twice during the observation. A rib or wing nipple should be avoided if possible since this will structurally reduce the amount of liquid loss which occurs.

Specific Scoring Information

a) Chewing or biting of the nipple is defined as a rhythmical biting action or chewing motion of the jaws. Either a tonic or phasic bite reflex may occur, interfering with sucking liquids.

b) Uncoordinated mouthing of the nipple is defined as a non-rhythmical initiation of liquid intake in which the jaw and/or tongue manipulate the nipple in a manner interfering with sucking liquids.

c) Inefficient sucking is defined as a sucking or suckling pattern characterized by an excessive degree of up-and-down movements, by marked variations in sucking rhythm or a lack of characteristic rhythm of sucking, or any pattern which more subtly appears to reduce the speed, skill or amount of liquid intake.

d) Weak sucking is defined as a sucking or suckling pattern in which the nipple can consistently be pulled out of the mouth with great ease. Many children use a less strong pattern when they are less hungry toward the end of the meal. However, other infants use a very weak grasp of the nipple with the tongue, lips or jaw even when very hungry. Often this is observed when feeding time is long and intake is small.

e) Unsustained sucking is defined as a sucking or suckling pattern which is characteristically broken by long pauses while the child appears to be resting, breathing or getting his movements organized.

f) A preemie nipple is the extremely soft nipple which is used for infants who have a weak suck.

g) A distinction should be made between reflexive biting and the playful biting of the nipple used intermittently by the normal infant during a developmental period in which chewing skills are developing. If the biting appears to be a playful game, or if it appears to be related to a period of concentration on chewing development (i.e., 6-12 months in the normal child), a score in the abnormal range should not be given.

h) If the child uses a rib nipple observations should also be made with a non-rib nipple, to determine whether liquid loss is present. Scoring should be based on observations with the regular nipple.

i) If the child uses an enlarged nipple hole or is force-fed, a regular nipple may be used for some meals. Scoring should be based on the most frequently used situation.

j) A child should not be penalized and scored in the abnormal range for unsustained sucking if this occurs primarily while looking around with strong visual attention.

k) Loss of liquid from the mouth which occurs when the baby burps should not be included in a definition of liquid loss during sucking.

l) If the child shows a tongue thrust, jaw thrust, biting or chewing when the nipple is reinserted into the mouth, a score of -6 would be given, even if sucking is more normal at other times.

m) Because many children are weaned from the bottle or breast by 12 months, a child above this age should be given a score of 12 months if not currently taking the bottle or breast. It is a score which states that a child is taking liquids by some other means and is past the age where taking the bottle or breast is expected. If the bottle or breast is given at a regular meal, a lower score should be given. If the child does not take liquids and is tube fed an X or a -9 would be given depending upon the presence or absence of abnormal reflexes which interfere. If there is a history of difficulty sucking the bottle and this behavior is not observed in a child over 12 months because of the child's age, medical difficulties or lack of experience with the bottle, a ? should be given. If there is no history of sucking difficulties with the bottle or breast when the child was weaned, a score of 12 months may be given. A score of 12 months should never be given to a child who is not observed with the bottle or breast when there has been a history of poor sucking. Scores of X, ? or -9 would be given depending upon the child's age and current feeding circumstances.

n) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of the suck which could be scored as -1 would include: profuse liquid loss which occurred constantly; hypotonic lips which were not able to maintain contact with the nipple; excess excursions of the jaw which do not result in a reduced intake; seizures which disrupt the sucking pattern; mild delays in initiating sucking; inadequate amounts of thinning and cupping of the tongue.

o) Guidelines for Use of the Clinical Judgement Score: Factors to consider when scoring a child between categories would include: the amount of liquid lost; the frequency with which liquid is lost; the frequency or severity of interference with sucking by abnormal reflex patterns.

#5. SUCKING: LIQUIDS FROM THE BOTTLE OR BREAST

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Takes liquids or thickened liquids from a bottle with an enlarged nipple hole. No or minimal sucking motions are observed. Liquid flows automatically into the mouth for swallowing. Sucking may be interfered with by jaw thrust, tongue thrust, tongue retraction, biting or mouthing, hypertonia or hypotonia of the tongue which limit tongue movement.<br>OR<br>b) The child is chronologically under the age of 12 months but is not given the bottle or breast due to the presence of abnormal patterns which interfere with sucking. Liquids are provided by tube feedings, cup or spoon. |
| -6 | a) Sucking or suckling motions occur intermittently or throughout the feeding. These are interfered with by chewing or biting of the nipple, or by an uncoordinated mouthing of the nipple.<br>OR<br>b) Initiation or continuation of sucking or suckling motions are interfered with by a tongue thrust or jaw thrust.<br>OR<br>c) Initiation of sucking is interfered with by tongue retraction or by the hard approximation of the tongue with the palate making insertion of the nipple difficult. However, with effort the nipple is inserted and some sucking or suckling is observed. |
| -4 | a) The child sucks or suckles the nipple without biting or chewing. Tongue and jaw thrust and tongue retraction do not occur. The nipple hole is enlarged or a preemie nipple is used for a child chronologically over 3 months of age.<br>OR<br>b) Sucking is slow, inefficient, weak or poorly sustained which may result in a small intake of liquid (i.e., 2 ounces or less in 30 minutes). |
| -3 | a) Exaggerated tongue protrusion is observed during sucking or as the nipple is inserted or removed. A true tongue thrust is not observed.<br>OR<br>b) A normal cupped configuration of the tongue is never observed during sucking or as the nipple is removed or reinserted. The tongue is passively flat, bunched, or humped during sucking. |
| -1 | Sucking patterns show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | Child is chronologically under 12 months and does not usually take liquids from the bottle or breast. May take liquids by tube feeding, spoon or cup. If presented with the bottle, there may be a complete lack of response or a refusal to suck. May suck a pacifier. Lack of bottle or breast feeding is not based on the presence of abnormal oral movements which would interfere with the sucking process. |
| 1 month | Uses a suckling or sucking pattern with the bottle or breast. The child may lose liquid during normal sucking and swallowing movements or as the nipple is inserted or removed from the mouth. |
| 6 months | Uses a suckling or sucking pattern with the bottle or breast. The child does not lose liquid during normal sucking and swallowing movements. May continue to show a slight amount of loss at the initiation or termination of the sucking sequence as the nipple is inserted or removed. |
| 9 months | Uses a suckling or sucking pattern with the bottle or breast. The child does not lose liquid during the initiation of sucking and swallowing or during normal sucking and swallowing movements. |
| 12 months | The child is chronologically older than 12 months, does not have a history of sucking difficulties and no longer is given the major liquid intake from the bottle. Takes liquids from a cup or spoon. May continue with the bottle in the evening before going to sleep. |

#6. SUCKING: LIQUIDS FROM THE CUP

Testing Procedure

If the child is on the cup or is at the chronological age of 6 months, an observation of cup drinking should be made. A clear cup or glass should be used for testing if at all possible. This will enable the examiner to see tongue and lip function more clearly. A liquid which the child likes should be used. However, the observation may be made easier if a clear liquid such as apple juice or water is acceptable to the child. Sucking should be observed in sitting or in as upright a position as is possible for the child. The cup should be placed for drinking in the way it is typically done at home. If the child shows biting or stabilizing on the edge of a cup placed between the teeth, cup drinking should also be tested with the cup placed only on the lower lip and not between the teeth or gums. Scoring of cup drinking is not dependent upon the frequency with which the cup is used at home. It may be scored if observed in the test situation.

Specific Scoring Information

a) Chewing or biting of the cup is defined as a rhythmical biting action or chewing motion of the jaws. Either a tonic or phasic bite reflex may occur interfering with sucking liquids from the cup.

b) Uncoordinated mouthing of the cup is defined as a non-rhythmical initiation of liquid intake in which the jaw and/or tongue manipulate the cup or liquid in a manner interfering with sucking liquids from the cup.

c) External jaw stabilization is defined as the lack of observable up-and-down movement of the jaw during drinking which occurs as the child bites down on the edge of the cup. When the cup is placed between the lips, the child may revert to the up-and-down movements of the jaw. Liquid intake is achieved through action of the tongue and lips.

d) Internal jaw stabilization is defined as the lack of observable up-and-down movement of the jaw during drinking which occurs through active co-activation of muscles controlling jaw opening and closure at the temporomandibular joint. The child is able to suck with stabilization when the cup is placed between the lips. Some steadying of movement may occur because of the approximation of the molars. Liquid intake is achieved through action of the tongue and lips.

e) Tongue protrusion at the point of swallowing and tongue thrust at the point of swallow must be differentiated from suckling or back-and-forward tongue movement in suckling liquids. This is frequently a difficult distinction in small infants or delayed children. However, if it appears that protrusion or tongue thrust occur only when the child swallows, an abnormal score should not be given.

f) All scoring should be based on the child's best consistent performance. Variations in physical abilities may occur depending upon cup placement and the child's habit patterns or familiarity with the placement. If, for example, the child shows a tonic bite pattern less than 50% of the time when the cup is placed between the teeth, he should be given an abnormal score of -6a. If the child is able to suck with internal jaw stabilization at least 75% of the time when cup placement is between the lips, he or she would also receive a normal score of +24 months. If, however, the internal jaw stabilization occurred only once or twice when placed between the lips, a normal score of 24 months or a clinical judgment score between 18 and 24 months would be given.

g) Some children will shove the cup far into the mouth so that the cup itself stabilizes the jaw in a more open position and reduces the amount of up-and-down movement. This type of stabilization should not be scored as either external or internal stabilization. The child should receive a lower score based upon whether the tongue is using a suckling or sucking motion. A clinical judgment score between 12 and 18 months could be given to indicate that the child was making some type of stabilizing attempt, providing suckling motions are not present.

h) Guidelines for Use of the -1 Score: Some of the mildly abnormal components of the suck which could be scored as -1 would include: hypotonic lips which were unable to maintain contact with the cup; profuse liquid loss in a child with extensive cup drinking experience and good tongue and jaw coordination; inappropriately wide up-and-down jaw excursions: seizures which disrupt the sucking pattern; mild delays in initiating sucking; inadequate amounts of thinning and cupping of the tongue.

i) Guidelines for Use of the Clinical Judgement Score: Factors to consider when scoring a child between categories would include: the amount of liquid lost; the frequency with which liquid is lost; the frequency or severity of interference with sucking by abnormal reflex patterns; the presence of a more advanced behavior of the tongue combined with a lower behavior in the jaw or vice versa; the occurrence of more advanced behaviors in an emerging state (less than 75% of the time) which would not allow for scoring at the more advanced level.

#6. SUCKING: LIQUIDS FROM THE CUP

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | No or minimal sucking movement occurs when liquid is placed in the mouth. Liquid is poured into the mouth from the cup with no initiating suck. |
| -8 | Sucking or suckling is present during cup drinking. Abnormal oral patterns occur more than 50% of the time when the cup is presented or enters the mouth, or during drinking. This interference is caused by:<br>a) Jaw thrust, jaw clenching, tonic bite reflex, phasic bite reflex, chewing or uncoordinated mouthing of the cup or liquid in the mouth.<br>OR<br>b) Tongue thrust, strong retraction of the tongue, or hard approximation of the tongue with the palate.<br>OR<br>c) Lip retraction or purse-string action.<br>OR<br>d) Severe hypotonia or muscle weakness of tongue, lips or jaw.<br>OR<br>e) Sucking or suckling movements which are abnormally slow or unsustained.<br>OR<br>f) Lack of an initiating suck. Sucking begins only after liquid is poured in. |
| -6 | Sucking or suckling is present during cup drinking. Abnormal oral patterns occur less than 50% of the time when the cup is presented or enters the mouth, or during drinking. This interference is caused by:<br>a) Jaw thrust, jaw clenching, tonic bite reflex, phasic bite reflex, chewing or uncoordinated mouthing of the cup or liquid in the mouth.<br>OR<br>b) Tongue thrust, strong retraction of the tongue, or hard approximation of the tongue with the palate.<br>OR<br>c) Lip retraction or purse-string action.<br>OR<br>d) Severe hypotonia or muscle weakness of the tongue, lips or jaw.<br>OR<br>e) Sucking or suckling movements which are abnormally slow or unsustained.<br>OR<br>f) Lack of an initiating suck. Sucking begins only after liquid is poured in. |
| -3 | a) Exaggerated tongue protrusion is observed during sucking or as cup is inserted or removed from the mouth. A true tongue thrust is not observed.<br>OR<br>b) Normal cupped configuration of tongue is never observed in drinking or as cup is inserted or removed. Tongue is passively flat, bunched or humped in drinking. |
| -1 | Sucking patterns show mildly abnormal components which may or may not have been previously described or the abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | Child is chronologically under 6 months and does not take liquids from the cup. Or cup drinking has not been introduced and/or tested because of gastro-intestinal disorders, structural disorders, delayed oral development due to prematurity, mental retardation, exclusive use of breast feeding, or other medical or behavioral reasons not related to a primary sucking or swallowing disorder. |
| 6 months | Child uses primarily a suckling pattern or a mixture of sucking and suckling. Extension-retraction motion of tongue is observed in drinking or as cup is inserted or removed. Jaw movement is a wide up-down or backward-forward motion. Loses liquid. |
| 12 months | Uses a sucking pattern when drinking from cup. Extension-retraction motions of tongue are not observed during drinking or as cup is inserted or removed. Jaw movement may be in a wide up-down or backward-forward direction. Tongue may protrude beneath cup. May lose liquid. |
| 18 months | a) Uses a sucking pattern when drinking from cup. External jaw stabilization is obtained by biting down on edge of cup. Upper lip is closed on edge of cup. Tongue does not protrude from mouth or rest beneath cup. May lose liquid.<br>OR<br>b) Minimal up-down or backward-forward movement occurs as child moves gradually from an unstabilized jaw movement toward internal jaw stabilization. |
| 24 months | Uses a sucking pattern with cup placed between lips. Internal jaw stabilization is obtained through co-activation of the jaw opening and closing muscles. This internal stabilization occurs less than 75% of the time during drinking sequences of 2 or more sucks. This pattern may alternate with slight up-down motion or biting on cup. May lose liquid. |
| +24 months | Uses a sucking pattern and active internal jaw stabilization without biting on cup. Internal stabilization occurs more than 75% of the time during drinking sequences of 2 or more sucks. This pattern may alternate with slight up-down motion or biting on cup. May lose liquid. |

#7. SUCKING: PUREED FOODS FROM A SPOON

Testing Procedure

If the child is already on the spoon or is at the chronological age of 3 months, an observation of spoon feeding should be made. Use strained fruit or pudding. Observe the child's responses during feeding. Smear some food on the lips to observe the child's manner(s) of removing the food, if this does not occur spontaneously. A slight delay should be introduced in bringing the food to the mouth in order to observe any tongue movement occurring with anticipation. The spoon should touch the child's teeth or remain momentarily in the mouth in order to test for the presence of a bite reflex. If a bite reflex is present when the spoon remains in the mouth, further testing should determine the frequency with which this occurs.

Specific Scoring Information

a) Tongue protrusion at the point of swallowing and tongue thrust at the point of swallow must be differentiated from suckling or back-and-forward tongue movement in suckling semi-solids. This is frequently a difficult distinction in small infants or delayed children. However, if it appears that protrusion or tongue thrust occur only when the child swallows, an abnormal score should not automatically be given.

b) It is important to differentiate jaw thrusting which occurs from anticipatory or tactile stimulation of the food, and the more normal thrusting or wide mouth opening seen in a gag reflex. If the jaw thrust is due to a gag related to the presence of food in the back of the mouth, it would be considered a swallowing problem and would not be scored in the abnormal range for sucking. If it occurs to touch of the spoon on the lips, teeth or front of the tongue and occurs before the spoon is removed from the mouth, it would be considered a sucking problem. In this case the child would receive a -8a or -6a.

c) If the mouth remains closed entirely during the sucking process it is difficult to evaluate configuration of the tongue to rule out the total absence of a cupped tongue configuration. In this instance the child should be given the benefit of the doubt if the examiner has made every attempt to part the lips and observe the tongue, and if a cupped configuration has been seen in other situations. If the cupped configuration is not observed in open-mouth crying or in other feeding situations, assume that it is not present in sucking from a spoon and score the child at -3a. A note to this effect should be made in the comment section of the score sheet.

d) Occasionally biting on the spoon will occur as a playful response in the young infant. A distinction should be made between the more automatic reflex biting and this type of play which the child uses intermittently or at the end of the meal. This occurs in normal children primarily during the period of learning to chew (i.e., 6-12 months) or when learning to stabilize on the edge of a cup (15-18 months). If the biting appears to be a playful game or is related to a period of concentration on chewing development or stabilization, a score in the abnormal range should not be given. In some athetoid children, what appears to be a bite reflex may simply be the child's own attempt to stabilize on the spoon (much as is done in cup drinking in the normal child). The therapist must make a qualitative judgment as to whether the bite is a reflex pattern or a more volitional way of coping with jaw instability. If the problem is one of poor jaw grading or instability, the child should not be scored as having a bite reflex.

e) A time range of 6 months exists for the normal introduction of pureed foods from a spoon. Some physicians may recommend that semi-solids be introduced during the first months. Others may prefer to wait until the baby is 6 months old. Thus, the score given to the child may not correctly reflect chronological age. An infant given cereal daily at 2 weeks would still be scored at 3 months; an infant who was not yet on semi-solids at 5 months would still receive a score of X. Appropriate comments should be made in the narrative-evaluation.

f) If the child is visually impaired, recognition of the approaching food through auditory, olfactory, or other sensory channels may be used to meet the criterion for 6 months.

g) Guidelines for Use of the -1 Score: Some of the mildly abnormal components of the suck which would be scored as -1 would include: profuse food and saliva loss in a child with extensive spoon experience and good tongue and jaw coordination; inappropriately wide up-and-down jaw excursions; physiological need to stabilize by biting on the edge of the spoon; consistent lip posturing of the lower lip drawn back under the upper incisors or gums; consistent tongue-palate contact with the midblade of the tongue; seizures which disrupt the sucking pattern; asymmetry of the tongue; inadequate amount of thinning and cupping of the tongue.

h) Guidelines for Use of the Clinical Judgement Score: Factors to consider when scoring a child between categories would include: the frequency or severity of interference with sucking by abnormal reflex patterns; the amount of food and saliva lost; the frequency with which food or saliva is lost; the occurrence of more advanced behaviors in an emerging state (less than 75% of the time) which would not allow for scoring at the more advanced level; the presence of a more advanced behavior in jaw, lips, or tongue, combined with lower level behaviors in the other areas; the speed and precision of use of upper lip movement in removal of food from the spoon or in cleaning of the lower lip; the degree of skill, precision or separation of tongue and jaw during lip cleaning with the tongue.

#7. SUCKING: PUREED FOODS FROM THE SPOON

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | No or minimal sucking movement occurs when pureed food is placed in the mouth. Food may be poured in from the spoon. The tongue moves it uncoordinatedly, and some may be swallowed. |
| -8 | Sucking or suckling movements are present during spoon feeding. Abnormal oral patterns occur more than 50% of the time when the spoon is presented, enters the mouth or as the food is being sucked to the back of the mouth. This interference is caused by:<br>a) Jaw thrust, jaw clenching, tonic bite reflex, phasic bite reflex, or chewing or uncoordinated mouthing of food in the mouth.<br>OR<br>b) Tongue thrust, strong retraction of the tongue, or hard approximation of the tongue with the palate.<br>OR<br>c) Lip retraction or purse-string action.<br>OR<br>d) Severe hypotonia of tongue, lips, or jaw.<br>OR<br>e) Sucking or suckling movements which are abnormally slow or unsustained. |
| -6 | Sucking or suckling movements are present during feeding. Abnormal oral patterns occur less than 50% of the time when the spoon is presented, enters the mouth or as the food is being sucked to the back of the mouth. This interference is caused by:<br>a) Jaw thrust, jaw clenching, or the tonic bite reflex, chewing or uncoordinated mouthing of food in the mouth.<br>OR<br>b) Tongue thrust, strong retraction of the tongue, or hard approximation of the tongue with the palate.<br>OR<br>c) Lip retraction or purse-string action.<br>OR<br>d) Severe hypotonia of tongue, lips, or jaw.<br>OR<br>e) Sucking or suckling motions which are abnormally slow or unsustained. |
| -3 | a) Exaggerated tongue protrusion is observed during sucking or as the spoon is inserted or removed. A true tongue thrust is not observed.<br>OR<br>b) A normal cupped configuration of the tongue is never observed when the spoon is presented, enters the mouth or as the food is being sucked to the back of the mouth. The tongue is passively flat, bunched or humped. |
| -1 | Sucking patterns show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | Child is chronologically under 3 months and does not take pureed foods from a spoon. Or spoon feeding has not been introduced because of gastro-intestinal disorders, structural disorders, delayed oral development due to prematurity, exclusive use of breast feeding or other medical or behavioral reasons not related to a primary sucking or swallowing disorder. |
| 3 months | Suckling or sucking pattern is observed in the tongue and/or jaw as food approaches mouth or touches lips. Upper lip does not assit in removal of food from spoon. |
| 6 months | The child shows visual or tactile recognition of the spoon. The tongue and jaw remain quiet until the food enters the mouth. The upper lip is slightly forward or downward but does not show a downward and forward movement which actively cleans the spoon. |
| 8 months | The upper lip moves downward and forward to posture or rest on the spoon and assist in removing food from the spoon. |
| 10 months | The lower lip draws inward as the spoon is removed or as food remains on the lower lip. Specific cleaning movements are not observed. The upper lip actively removes the food from the spoon. |
| 15 months | The upper incisors are used to clean the lower lip as it draws inward. The tongue shows sucking or a mixture of sucking and suckling. A phasic bite reflex is not present at any time; however, some playful biting on the spoon in a game-like fashion may continue to occur. |
| +24 months | The tongue is used in a free sweeping movement to clean food from the upper or lower lips. Tongue elevation and depression are independent of jaw movement and show some skillful action of the tongue tip. Slight lateral movements of the jaw may be observed. Suckling movements of the tongue may occur intermittently. |

## AN APPROACH TO THE EVALUATION OF SWALLOWING BEHAVIORS

### Basic Concepts

Swallowing behaviors are among the first to appear prenatally. Initially they are fused with the sucking or intake pattern in a chained response which some have called the suck-swallow reflex or suckle-swallow pattern. Initially the infant is dependent upon an initiating suckle to trigger a swallowing reflex. Gradually, an independence of swallowing develops. The child develops a clear-cut oral stage of the swallow which has more volitional components, and retains the more reflexive pharyngeal stage of the swallow. The Pre-Speech Assessment Scale is concerned primarily with changes in the oral stage of the swallow. This includes the movements of tongue, lips, and cheeks necessary to form a bolus from the food or liquid in the front of the mouth and propel it into the pharyngeal area for the final swallow. It involves a fine coordination of oral movements and integration with respiratory patterns.

The distinction between sucking and swallowing is a clearer one when measured by cinefluorographic techniques. It is frequently a difficult observation for the clinical eye. The description and measurement of swallowing behaviors within the Pre-Speech Assessment Scale describes: a) the ability to move food and liquid efficiently to the back of the mouth, b) the ability to handle foods with lumps and to organize the lumps or solid foods into a bolus and swallow without gagging from food residues on the back of the tongue, c) the ability to use an elevated tongue-tip position during the swallow and d) the efficiency with which the lips prevent the loss of food and saliva during the swallow and the coordination of sucking and swallowing movements with respiration.

An important distinction has been made between a tongue thrust and a simple protrusion of the tongue during swallowing. The examiner should note carefully that the term, tongue thrust, is used to describe an abnormal movement of forceful protrusion of the tongue. It does not describe the simple protrusive movement which is referred to as a "tongue thrust swallow" in much of the dental and speech literature. The distinction between normal primitive and abnormal function is a critical concept within the Pre-Speech Assessment Scale. The abnormal tongue thrust of a neurologically impaired child is both qualitatively and quantitatively different from the early simple protrusion of the young child. Individuals receiving orthodontic care and myofunctional therapy have frequently retained the latter simple tongue protrusion into later childhood and adulthood.

### Relationship to Pre-Speech and Communication Function

Relationships between swallowing behaviors and speech development are only speculative. The development of tongue-tip elevation and a spread semi-retracted tongue position occurs in the acquisition of more mature swallowing patterns. These movement patterns also appear in speech production of phonemes such as /t/, /d/, /n/, /l/ which require elevation of the tip of the tongue, and /s/, /z/, /sh/, /zh/, /ch/ and /j/ which require a slightly retracted and spread position. Distortions of these latter phonemes or the substitution of the /th/ has been associated with retention of the simple tongue protrusion pattern in swallowing. This has been described in the literature providing a rationale for involvement of the speech pathologist in myofunctional therapy.

## MOVEMENT CHARACTERISTICS OF THE TONGUE DURING SWALLOWING ON A CONTINUUM FROM NORMAL TO ABNORMAL

| Characteristics of Tongue and Movement | Elevated Tongue | Simple Protrusion | (Extension-retraction) or Suckle-Swallow | Exaggerated Protrusion | Tongue Thrust |
|---|---|---|---|---|---|
| Configuration | Flat, thin. | Flat, thin. | Flat, thin, usually grooved or bowl-shaped. | Flat, thin, bowl-shaped or Thick and bunched. | Thick and bunched. |
| Direction of Movement | Upward toward the alveolar ridge. | Outward toward or between incisors. | Outward toward or between incisors. | Outward between incisors or lips. | Outward between incisors or lips. May show downward movement or lateral deviation. |
| Range of Movement | To alveolar ridge | Between incisors as far as middle of the lips maximum range. | To gums or incisors. May protrude to middle of lips. | Exaggerated. Protrusion beyond the border of the lips | Protrusion between gums and usually beyond the border of the lips. |
| Strength or Force of Movement | Non-forceful, easy movement. | Non-forceful, easy movement. | Non-forceful, easy movement. | Non-forceful, easy movement or Strength may be slightly weak due to hypotonicity. | Forceful. Strong protrusion. Muscle tone of tongue is frequently hypertonic. |
| Preceding Action of the Tongue | Sucking or chewing. | Sucking or chewing. | Suckling | Suckling, sucking or chewing. | Sucking, suckling or chewing. |
| Separation of Tongue and Jaw Movements (Primarily in Vertical Plane) | Separation of jaw from an elevated tongue. Later the tongue actively separates and moves upward from the jaw. | No vertical separation. Horizontal separation as jaw quiets and tongue moves forward. | No movement separation. Jaw and tongue move together although direction of movement may be different. | No movement separation. | No movement separation |
| Degree of Normalcy | Most advanced patterns. Present intermittently by 12 months. Increases in frequency with age. | Normal pattern of mid-infancy. Begins as the child shifts to sucking; i.e., 5-6 months. Continues intermittently through pre-school years. | Normal pattern of early infancy; i.e., birth 6-9 months. Replaced by simple protrusion. | Mildly abnormal. | Moderately to severely abnormal. |

## III. SWALLOWING

### Common Definitions

The following definitions of terms apply to all or most of the categories in the Swallowing Section. For purposes of conservation of space and increased clarity, they will be provided for the examiner only at the beginning of this section.

a) Very slow swallowing with difficulty moving liquid or food into the pharynx for swallowing can be defined as a situation in which the child appears to require an unusual amount of time to swallow a given amount of liquid or food. Sucking or suckling may appear to be quite active but very few active or palpable swallows can be felt. Or the same spoonful of food remains in the mouth or re-appears at the lips. Small spoonfuls of food are ejected from the mouth or are not moved into the pharynx for swallowing. Difficulty in swallowing may be due to a strong tongue thrust pattern or to exaggerated tongue protrusion.

b) Passive or inactive swallowing is defined as a minimal type of swallowing pattern. The child swallows the liquid or food, but this may be by passively letting it flow down the pharynx and into the esophagus with minimal muscle action. This can be tested for by observing or feeling for the normal elevation of the hyoid bone and larynx which occurs at the point of swallow. The head is often extended.

c) Pooling of liquid, mucous or food in the oro-pharynx, if observed, may be related to very slow swallowing. The child may make many sucking movements with little swallowing. Food or liquid tends to pool or be stored in the back of the mouth, between the dorsum of the tongue and the lowered soft palate, or in the upper pharynx itself.

d) Nasal regurgitation of liquid or food is the loss of food or liquid through the nose during sucking and swallowing.

e) Lip retraction is defined as the drawing back of the lips so that they form a tight, horizontal line over the mouth. In this position it may become difficult for the child to develop enough intra-oral pressure to obtain an efficient swallow.

f) Jaw thrust is defined as a strong downward extension of the lower jaw when the bottle, cup or spoon is removed from the mouth. The strength and tension involved assist in differentiating the jaw thrust from the normal full opening of the jaw which occurs in young infants. The jaw may appear to be stuck in the open position and the child may have difficulty closing the mouth to swallow. Jaw thrusting during swallowing may be part of a gag reflex triggered by food resting on the back of the tongue.

g) Tongue retraction is defined as the strong pulling back of the tongue into the pharyngeal space. The tip of the tongue may be strongly elevated toward the middle of the palate, or it may be depressed as the back of the tongue is bunched and elevated. A child with swallowing difficulties may actively use a tongue retraction pattern to prevent liquid or food from entering the pharynx too rapidly.

h) Tongue thrust is defined as a forceful protrusion of the tongue from the mouth. It is generally seen as a stronger movement than the slight protrusion seen in either the infantile swallowing pattern, or the mildly abnormal exaggerated tongue protrusion. The tongue often appears thick or bunched during the thrust. The thrust during swallowing occurs after the nipple, cup or spoon is removed from the mouth and the child is swallowing the last mouthful.

i) Exaggerated tongue protrusion is defined as a non-forceful protrusion of the tongue between the incisors and lips in which the range or extent of protrusion is excessive or exaggerated.

j) An elevated tongue tip position is defined as the separation of the tongue from the lower jaw so that the front or tip of the tongue makes contact on the alveolar ridge just behind the central incisor area of the upper gums. Initially this may occur as a lag in descent of the tongue as the jaw drops down followed by the tongue. This could more accurately be described as a separation of the jaw from the tongue. In its later development the jaw remains stable in a lowered or neutral position and the tongue separates from the jaw in a true tongue-tip elevation. Both types of separation patterns will be considered as forms of the elevated tongue position.

k) Tongue-tip elevation is broadly defined as elevation of the front 1/3 of the tongue. Thus, acceptable contact would include the tip, anterior blade or entire anterior 1/3 of the tongue with the hard palate.

## #8. SWALLOWING: LIQUIDS

### Testing Procedure

Observe the child's best performance in the easiest position and with the easiest type of liquid. If the child is chronologically 6 months or older, testing should be done with the cup. If liquid intake is through the bottle or breast for at least one meal, observation should be made during breast or bottle feeding. If the child takes liquids from both bottle and cup, observations should be drawn from both sources. If the lips are closed during the swallow, the examiner should occasionally part them slightly with a finger to observe whether the tongue protrudes between the teeth during the swallow. If the child typically swallows with the head in extension, it should be manually brought forward by the examiner to determine whether the child is able to swallow with the head in a more upright or forward position. Often the larynx and hyoid bone can be seen elevating as the child swallows. If this is not immediately observable, the examiner should place a finger in the hyoid-larynx area and feel for the normal elevation which signifies an active swallow. The child should be tested in the most upright position which is possible.

### Specific Scoring Information

a) Swallowing with extension of the head more than 75% of the time implies that food is poured down the throat with little active swallowing. In addition, the child shows difficulty swallowing when the head is brought into an upright position. A child showing this pattern would receive a -8b. Some children will keep the head in a more upright position until the final swallow and will then spontaneously extend the head to assist swallowing. They may spontaneously use some extension while drinking but can continue to swallow when the head is brought into an upright position. A child showing either of these patterns would receive a score of -6d. It is important to determine whether the child uses head extension in order to facilitate the swallow and has difficulties with swallowing if the head is in a more upright position. If head extension is the child's typical response to visual or inter-personal contact, this distinction may be difficult.

b) A score in the normal developmental range would not be given unless a normal swallow pattern occurred at least 75% of the time. Abnormalities falling within the -1 category, reflecting the deviations in the quality of tongue or lip movement, would not be counted against the child in computing the 75% level of competence.

c) Determine whether lip, jaw, tongue retraction, or severe tongue thrust actually interfere with the efficiency of the swallow. This may be seen in compensatory head extension to prevent liquid loss, increased retraction with thinner liquids, etc. Mild forms of retraction patterns may be non-interfering with the swallow, and should not be given a score of -6e. A score of -1 would be appropriate. Mild to moderate tongue thrust should be scored as -4.

d) If the child is taking thickened liquids, the examiner should check the child's abilities with thin liquids. If the child can swallow without the thickening but this is used to simply make it easier, he or she should receive a score of -6g. If the child is unable to swallow liquids and either doesn't swallow, or coughs and chokes to the point where it appears medically dangerous, a score of -9 should be given. If thickening is to such an extent that it is really a semi-solid, the child would receive -9 for the ability to swallow liquids if nothing thinner can be handled.

e) If the child's performance is markedly different with the bottle and the cup, scoring should be based on the most frequent method of liquid intake. Thus, if the child showed severe tongue thrusting with the cup but not with the bottle, a score of -6e would be given if primary liquid intake were from the cup. An abnormal score would not be given if the primary liquid intake were through the bottle. Notations on the differences observed should be made in the narrative evaluation.

f) An attempt should be made to determine whether the elevated tongue position which the child uses involves the tip of the tongue or the mid-blade. If the front or tip of the tongue does not elevate, the child should be given a double score. A -1 should be given to indicate that the child is not using an elevated tip; a normal score of at least 12 months should also be given to indicate that the front 1/3 of the tongue does elevate.

g) An intermittent elevated tongue position is defined as a tongue elevation which occurs a minimum of two times.

h) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of the swallow which could be scored as a -1 would include: elevation of the mid-blade of the tongue rather than the tip; consistent posturing of the lower lip drawing back under the upper incisors or gums; hypotonic lips; jaw deviation; facial grimacing or tension in the clavicular area with initiation of the swallow; hypotonia which contributes to a thick looking tongue; lateral deviation of the tongue during swallowing.

i) Guidelines for Use of the Clinical Judgement Score: Factors to consider when scoring a child between categories would include: the frequency or severity of interference with swallowing by abnormal patterns; the amount of liquid lost; the frequency with which liquid or saliva is lost; the occurrence of more advanced behaviors in an emerging state; the presence of a more advanced behavior in jaw, lips, or tongue, combined with lower level behaviors in the other areas; the speed and precision of lip and tongue movements.

#8. SWALLOWING: LIQUIDS

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child takes no liquids by mouth due to a primary sucking or swallowing disorder. Child is on tube feeding for liquids or takes liquid in jello or semi-solid form. No swallowing movements are observed when liquid reaches the back of the mouth. |
| -8 | a) Swallowing movements occur spontaneously during feeding, but the child does not take enough liquid by mouth to prevent dehydration. Additional liquid is given by tube feeding.<br>OR<br>b) Strong head extension or flexion during swallowing of liquids is observed more than 75% of the time. The child resists positioning to maintain the head upright for swallowing. |
| -6 | All liquids are given by mouth and supplemental tube feedings are not given. Liquids may be thickened to increase the ease of swallowing; however, a liquid consistency is maintained. Swallowing is considered poor or difficult because of:<br>a) Nasal regurgitation.<br>OR<br>b) Very slow swallowing due to difficulty moving the liquid backward into the pharynx for swallowing, or pooling of liquid in the oro-pharynx.<br>OR<br>c) Very passive swallowing with minimal upward movement of larynx and hyoid bone during the swallow.<br>OR<br>d) Spontaneous use of head extension to assist with the swallow; doesn't resist attempts to reduce head extension.<br>OR<br>e) Lip, tongue or jaw retraction, jaw thrust, or severe tongue thrust which appears to interfere with swallowing.<br>OR<br>f) Coughing, choking, or gagging, occurring more than 3 times during a meal.<br>OR<br>g) Greater difficulties with certain types of liquid (i.e., thin, milky). |
| -4 | Tongue thrust is observed during swallowing which may or may not interfere with the movement of liquid into the pharynx for efficient swallowing. |
| -3 | Exaggerated tongue protrusion is observed during swallowing. A true tongue thrust is not observed. |
| -1 | Swallowing patterns show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not take liquids due to gastro-intestinal disorders, structural disorders, delayed oral development due to prematurity or other medical or behavioral reasons not related to a primary sucking or swallowing disorder. |
| 1 month | Swallows thin liquids from the bottle or breast. The tongue may protrude with an extension-retraction movement pattern during the swallow or it may simply protrude between the teeth. |
| 6 months | Swallows liquids from the cup with no observable elevated tongue-tip position. The tongue protrudes with an extension-retraction movement pattern during the swallow or shows simple protrusion between the teeth. The lips may be open during the swallow. There may be loss of liquid. |
| 12 months | Swallows liquids from the cup with an intermittent elevated tongue-tip position. This pattern may alternate with either an extension-retraction pattern or simple protrusion of the tongue between the teeth. The lips may be open during the swallow. There may be loss of liquid. |
| 24 months | Swallows from the cup with easy lip closure and no loss of liquid both during drinking and after the cup is removed from the mouth. An elevated tongue position is used intermittently or consistently for swallowing. |
| + 24 months | Swallows with no observable extension-retraction or protrusive movements of the tongue. Uses easy lip closure as needed and no liquid loss during drinking or after the cup is removed from the mouth. |

#9. SWALLOWING: SEMI-SOLIDS

Testing Procedures

If the child has begun semi-solid foods or is at a chronological age of at least 3 months, observations should be made of swallowing semi-solids. Carefully question the parent about the child's behavior at home with different varieties of pureed or soft foods. Observe the child's swallowing pattern with pudding, applesauce or another food of this soft, smooth consistency which the child likes. If the lips are closed during the swallow, the examiner should part them slightly with a finger to observe whether the tongue protrudes between the teeth during the swallow. If the child typically swallows with the head in extension, it should be brought forward by the examiner to see whether the child is able to swallow with the head in a more upright or forward position. Often the larynx and hyoid bone can be seen elevating as the child swallows. If this is not immediately seen, the examiner should place a finger in the hyoid-larynx area and feel for the normal elevation which signifies an active swallow. The child should be tested in the most upright position which is possible.

Specific Scoring Information

a) Semi-solids are defined as any soft, smooth food with a thick or heavy consistency. These are generally non-lumpy foods. This would include pureed or strained foods of any type and common foods such as custard, pudding, applesauce, yogurt, and cream of wheat.

b) An intermittent elevated tongue position is defined as a tongue elevation which occurs a minimum of two times.

c) Swallowing with head extension more than 75% of the time implies that food is poured down the throat with little active swallowing. In addition, the child shows difficulty swallowing when the head is brought into an upright position. A child showing this pattern would receive a -8b. Some children will keep the head in a more upright position until the final swallow and will then spontaneously extend the head to assist swallowing. They may spontaneously use some extension while eating but can continue to swallow when the head is brought into an upright position. A child showing either of these patterns would receive a score of -6d. It is important to determine whether the child uses head extension in order to facilitate the swallow and has difficulties with swallowing if the head is in a more upright position. If head extension is the child's typical response to visual or interpersonal contact, this distinction may be difficult.

d) A score in the normal developmental range would not be given unless a normal swallow pattern occurred at least 75% of the time. Abnormalities in the -1 category, reflecting deviations in the quality of tongue and lip movement, would not count against the child in computing the 75% level of competence.

e) Determine whether lip, jaw, or tongue retraction or severe tongue thrust actually interfere with the efficiency of the swallow. This may be seen in compensatory head extension to prevent liquid and food loss, increased retraction with thinner semi-solids, etc. Mild forms of retraction patterns may be non-interfering with the swallow and should not be given a score of -6e. A score of -1 would be appropriate. Mild to moderate tongue thrust should be scored as -4.

f) Occasionally the child will hold some foods in the mouth for behavioral reasons rather than physical inability to swallow. If this occurs with all foods, a physical component should be suspected. The child should be scored for the best behavior. If all food is held in the mouth and the child shows no greater advanced behavior, a -6b would be given even if behavioral problems are suspected.

g) It is important to determine as accurately as possible when the swallow is occurring. This can be done by feeling for elevation of the hyoid-larynx area or by observing tightening or contraction of the lips or cheeks which is often seen in the young child. This differentiation is critical in the determination of whether food or saliva loss occurs during swallowing or whether the loss is related to the sucking of the food.

h) An attempt should be made to determine whether the elevated tongue position which the child uses involves the tip of the tongue or the mid-blade. If the front or tip of the tongue does not elevate, the child should be given a double score. A -1 should be given to indicate that the child is not using an elevated tip; a normal score of at least 12 months should also be given to indicate that the front 1/3 of the tongue does elevate.

i) Scoring above 12 months requires that the child uses easy lip closure as needed. This does not have to occur consistently; provisions should be made during testing to give the child large enough mouthfuls that lip closure is needed.

j) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of the swallow which could be scored as a -1 would include: elevation of the mid-blade of the tongue rather than the tip; hypotonia which contributes to a thick looking tongue, consistent posturing of the lower lip drawing back under the upper incisors or gums; hypotonic lips, jaw deviation, facial grimacing, or clavicular tension during the swallow; lateral deviation of the tongue during swallowing.

k) Guidelines for Use of the Clinical Judgment Score: Factors to consider when scoring a child between categories would include: the frequency or severity of interference with swallowing by the abnormal patterns; the amount of food and saliva lost; the frequency with which food or saliva is lost; the occurrence of more advanced behaviors in an emerging state (less than 75% of the time) which would not allow for scoring at the more advanced level; the presence of a more advanced behavior in jaw, lips or tongue combined with lower level behaviors in the other areas; speed and precision of lip and tongue movements; the frequency of coughing, choking or gagging.

#9. SWALLOWING: SEMI-SOLIDS

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child does not take semi-solids by mouth due to a primary sucking or swallowing disorder. Child may be tube fed. No swallowing movements are observed when semi-solid foods are placed in the mouth. |
| -8 | a) Swallowing movements occur spontaneously during feeding, but the child doesn't take enough food by mouth. Additional tube feedings are given to supplement semi-solid food intake; however, some semi-solid food is taken by mouth.<br>OR<br>b) Strong head extension or flexion during swallowing of semi-solids is observed more than 75% of the time. The child resists positioning to maintain the head upright for swallowing. |
| -6 | All semi-solids are given by mouth and tube feedings are not given to supplement semi-solid or solid food intake. However, the child may continue to receive tube feedings for liquids. Swallowing of semi-solids is considered poor or difficult because of:<br>a) Nasal regurgitation.<br>OR<br>b) Very slow swallowing due to extreme difficulty moving the food backward into the pharynx for swallowing, or pooling of food in the oro-pharynx.<br>OR<br>c) Very passive swallowing with minimal upward movement of the larynx and hyoid bone during the swallow.<br>OR<br>d) Spontaneous use of head extension to assist with the swallow. Doesn't resist attempts to reduce head extension.<br>OR<br>e) Lip, tongue or jaw retraction, jaw thrust, or severe tongue thrust which appears to interfere with swallowing.<br>OR<br>f) Gags, chokes, coughs, vomits, or spits semi-solid foods more than 25% of the time. |
| -4 | Tongue thrust is observed during swallowing which may or may not interfere with movement of food into the pharynx for efficient swallowing. |
| -3 | a) Exaggerated tongue protrusion is observed during swallowing. A true tongue thrust is not observed.<br>OR<br>b) The child is able to swallow semi-solid foods only when excessive suckling action, the thumb, a pacifier or other object is placed in the mouth to trigger a suck-swallow sequence. This occurs more than 50% of the time. |
| -1 | Swallowing patterns show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | The child does not take semi-solids due to age, exclusive breast feeding, gastro-intestinal disorders, delayed oral development due to prematurity or other medical or behavioral reasons not related to a primary sucking or swallowing disorder. |
| 3 months | Swallows soft or pureed foods (semi-solids). Gagging, choking, coughing, vomiting or spitting occur less than 25% of the time. The child uses a primitive suckle-swallow response to move food into the pharynx for swallowing. Some food is pushed out of the mouth. |
| 6 months | Gagging, choking, coughing, vomiting, or spitting occur less than 3 times during a meal. The tongue shows an extension-retraction pattern or simple protrusion between the teeth during the swallow. Food is not pushed out of the mouth by the tongue, although minor losses of food and saliva occur. |
| 9 months | The child does not depend upon a suckle-swallow response to move food into the pharynx for swallowing. Some swallows follow the up-down tongue movement of the true suck. The tongue shows a simple protrusion between the teeth or gums. Some extension-retraction movements of the tongue may continue intermittently. |
| 12 months | Swallows semi-solid foods with an intermittent elevated tongue-tip position. This pattern may alternate with tongue protrusion. Swallows with easy lip closure as needed and no loss of food or saliva. |
| 18 months | An elevated tongue position is used intermittently or consistently for swallowing. Some simple protrusion of the tongue may be observed during swallowing. No extension-retraction movements of the tongue are present. |
| + 24 months | Swallows with no loss of food or saliva. An elevated tongue is used for swallowing. No tongue protrusion is observed. |

Testing Procedure

If the child has begun solid foods or is at a chronological age of at least 6 months, observations should be made for swallowing solids. Carefully question the parent about the child's behavior at home with different varieties of solid, lumpy foods. Observe the child's swallowing patterns with any lumpy or chewable food which the child likes. Cookies or other easily soluble food should not be used. If the lips are closed during the swallow, the examiner should occasionally part them slightly with a finger to observe whether the tongue protrudes between the teeth during the swallow. If the child typically swallows with the head in extension, the head should be manually brought forward by the examiner to determine whether the child is able to swallow with the head in a more upright or forward position. Often the larynx and hyoid bone can be seen elevating as the child swallows. If this is not immediately observable, the examiner should place a finger in the hyoid-larynx area and feel for the normal elevation which signifies an active swallow. The child should be tested in the most upright position which is possible.

Specific Scoring Information

a) Solid foods are defined as any ground, mashed or chopped foods which contain noticeable lumps. Prepared junior foods may be counted if this is the most solid consistency which the child eats. If junior foods are used, care should be taken to select those with the lumpiest consistency. Although cookies would be considered in roughly the same category as junior foods, for testing purposes they should not be used because of their tendency to melt in the mouth. The most advanced level of solid foods that the child will take should be used for observing the swallow.

b) Difficulties in forming a bolus for swallowing may be suspected when on observation the food is scattered throughout the mouth. This frequently leads to coughing, choking or gagging as small pieces of food remain on the back of the tongue. Children with poor interaction of the cheeks and the tongue frequently have difficulties with bolus formation.

c) An intermittent elevated tongue position is defined as tongue elevation which occurs a minimum of two times.

d) Swallowing with the head in extension more than [illegible] of the time implies that food is poured down the throat with little active swallowing. [illegible]ddition, the child shows difficulty swallowing when the head is brought into an upright position. [illegible]child showing this pattern would receive a -8. Some children will keep the head in a more upright [illegible]tion until the final swallow and will then spontaneously extend the head to assist swallowing. [illegible]ey may spontaneously use some extension while eating but can continue to swallow when the head is brought into an upright position. A child showing either of these patterns would receive a score of -6d. It is important to determine whether the child uses head extension in order to facilitate the swallow and has difficulties with swallowing if the head is in a more upright position. If head extension is the child's typical response to a visual or interpersonal contact, this distinction may be difficult.

e) A score in the normal developmental range would not be given unless a normal swallow pattern occurred at least 75% of the time. Abnormalities in the -1 category, reflecting deviations in the quality of tongue and lip movement, would not be counted against the child in computing the 75% competence.

f) Determine whether lip, jaw or tongue retraction or severe tongue thrust actually interfere with the efficiency of the swallow. This may be seen in compensatory head extension to prevent liquid and food loss, increased retraction with thinner lumpy solids, etc. Mild forms of retraction patterns may be non-interfering with the swallow and should not be given a score of -6e. A score of -1 would be appropriate. Mild-to-moderate tongue thrusting would be scored as -4.

g) Occasionally the child will hold some foods in the mouth for behavioral reasons rather than the physical inability to swallow. If this occurs with all solids, a physical component should be suspected even if the parent feels it is entirely behavioral. The child should be scored for the best behavior. If all food is held in the mouth and the child shows no greater advanced behavior, -6b would be given even if behavioral problems are suspected.

h) It is important to determine when the swallow occurs. This can be done by feeling for elevation of the hyoid-larynx area or by observing tightening or contraction of the lips or cheeks which is often seen in the young child. This differentiation is critical in the determination of whether food or saliva loss occurs during swallowing or whether the loss is related to the chewing of food.

i) An attempt should be made to determine whether the elevated tongue position which the child uses involves the tip of the tongue or the mid-blade. If the front or tip of the tongue does not elevate, the child should be given a double score. A -1 should be given to indicate that the child is not using an elevated tip; a normal score of at least 12 months should also be given to indicate that the front 1/3 of the tongue does elevate.

j) Scoring above 18 months requires that the child use easy lip closure as needed. This does not have to occur consistently; provision should be made during testing to give the child large enough mouthfuls that lip closure is needed.

k) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of the swallow which could be scored as a -1 would include: elevation of the mid-blade of the tongue rather than the tip; hypotonia which contributes to a thick looking tongue; consistent posturing of the lower lip drawing back under the upper incisors or gums; hypotonic lips; jaw deviation; facial grimacing during the swallow; lateral deviation of the tongue during swallowing.

l) Guidelines for Use of the Clinical Judgment Score: Factors to consider when scoring a child between categories would include: the frequency or severity of interference with swallowing by abnormal patterns; the amount and frequency of food or saliva lost; the presence of emerging behaviors; the presence of a more advanced behavior in the jaw, lips or tongue combined with lower level behaviors in other areas; speed and precision.

#10. SWALLOWING: SOLIDS

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child does not take solid foods by mouth due to a primary sucking or swallowing disorder. Child may be tube fed. No swallowing movements are observed when solid foods are placed in the mouth. Active rejection of solid foods and refusal or inability to swallow may be related to severe oral hypersensitivity. |
| -8 | Strong head extension or flexion during the swallowing of solid foods is observed more than 75% of the time. The child resists positioning to maintain the head upright for swallowing. |
| -6 | Swallowing of solids is considered poor or difficult because of:<br>a) Nasal regurgitation.<br>OR<br>b) Very slow swallowing or extreme difficulty moving the food backward into the pharynx for swallowing.<br>OR<br>c) Very passive swallowing with minimal upward movement of the larynx and hyoid bone during the swallow.<br>OR<br>d) Spontaneous use of head extension to assist with the swallow; doesn't resist attempts to reduce head extension.<br>OR<br>e) Lip, tongue or jaw retraction or jaw thrust which appear to interfere with swallowing.<br>OR<br>f) Gags, chokes, coughs, vomits, or spits solid foods more than 25% of the time.<br>OR<br>g) Difficulties in forming a bolus for swallowing. |
| -4 | Noticeable tongue thrust is observed during swallowing which may or may not interfere with movement of food into the pharynx for efficient swallowing. |
| -3 | a) Exaggerated tongue protrusion is observed during swallowing. A true tongue thrust is not observed.<br>OR<br>b) The child is able to swallow solid foods only when excessive suckling action, the thumb, a pacifier, or other object is placed in the mouth to trigger a suck-swallow sequence. This occurs more than 50% of the time. |
| -1 | Swallowing patterns show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | The child does not take or swallow solids due to age, exclusive breast feeding, gastro-intestinal disorders, delayed oral development due to prematurity or retardation, or other medical or behavioral reasons not related to a primary sucking or swallowing disorder. |
| 6 months | Swallows some ground, mashed or chopped table foods with noticeable lumps. Gags, chokes, spits, or vomits less than 25% of the time from food of this type contacting or resting on the posterior half of the tongue. May use a simple protrusion of the tongue between the teeth or extension-retraction movements. |
| 12 months | Swallows ground, mashed or chopped table foods with noticeable lumps. Gagging choking, vomiting or spitting occur less than 3 times during a meal. Uses an intermittently elevated tongue-tip position. This pattern may alternate with a simple protrusion of the tongue between the teeth. No extension-retraction movements are present during swallowing. There may be loss of food or saliva. |
| 18 months | Swallows solid foods with easy lip closure as needed and no loss of food or saliva. An elevated tongue position is used for swallowing. Some protrusive movements of the tongue are observed during swallowing. |
| + 24 months | Swallows solid foods with easy lip closure as needed and no loss of food or saliva. An elevated tongue position is used for swallowing. No tongue protrusion is observed during swallowing. |

## #11. COORDINATION OF SUCKING, SWALLOWING AND BREATHING

### Testing Procedure

The child should be observed with the bottle or breast if liquids are still taken in this manner. If the child has a chronological age of at least 6 months, observation should be made with the cup even if the cup is not consistently used at home. If the child is under 6 months and the cup has already been introduced, observations of cup drinking should be made. Because children show a more regular sucking and breathing rhythm during the first five minutes, observations for scoring purposes should come from the first five-minute period with the bottle, breast or cup. The position and type of liquid which is easiest for the child should be used. Care should be taken to select a liquid which the child likes.

Drinking behavior should be assessed at a time when the child is likely to be thirsty. This will vary with different children. Ask the parents whether the best drinking occurs at the beginning or end of the meal. However, do not fill the child completely with food and then expect the best rapid sequential drinking to occur. If the child is considered to be a good cup drinker by the parents, a clear plastic cup with one ounce markings on the side will assist in determining whether a score of 15 months can be given.

### Specific Scoring Information

a) Marked respiratory distress may be noted by noisy breathing, gasping, nasal flaring, strongly increased reverse breathing patterns, and clavicular breathing. Retraction at the jugular notch of the sternum, between the ribs, or between the lower ribs and the abdominal cavity may also be observed. In mild to moderate respiratory distress the symptoms are less pronounced or fewer components are present.

b) The jugular notch of the sternum is the deep notch on the upper border of the sternum between the end of the clavicles.

c) Clavicular breathing involves activity of the muscles which run from the clavicle (or collarbone) and the sternum to the head. Contraction of these muscles results in lifting the shoulders and upper chest. This provides additional volume in the chest by increasing the vertical dimension. Clavicular breathing is seen spontaneously when breathing is distressed, or when severe anxiety is present.

d) Respiratory incoordination is defined as a milder form of respiratory distress which does not usually result in medically dangerous problems such as aspiration pneumonia. Many of the same characteristics of respiratory distress may be present but are seen only in a more mild form. Often the child cannot get the timing of breathing with sucking and swallowing. Stops to breathe between sucks, or coughing, sputtering, and choking excessively may occur. One gets the feeling more of poor coordination than of a major, primary respiratory problem. The child with respiratory distress problems usually has these primary respiratory difficulties during non-feeding times. They become worse with feeding. The child with respiratory incoordination during feeding usually does not have major respiratory difficulties at non-feeding times.

e) A major distinction which must be made is the degree of severity of respiratory distress during feeding. One of the differences between a score of -7 and a score of -3a is that of respiratory problems which are or are not life endangering. Many of the children who would receive a -7 would be children who do not handle their own secretions well, making suctioning necessary, have a need for postural drainage before or after feeding, have a history of medically diagnosed Respiratory Distress Syndrome (RDS), or have had a history of aspiration pneumonia. Children receiving a -3a would not be major causes for medical concern but might show some of the described signs for respiratory distress or respiratory incoordination.

f) If the child takes a cup for liquid intake and does not take the bottle at all, a score of 6 or above should be given if some normal behaviors are present with the cup.

g) If the child's behavior is in the normal range for the bottle, and in the abnormal range for the cup (or vice versa), the most commonly used form of liquid intake should be selected for scoring. Thus, if the child took the bottle for most meals, the behavior with the bottle would be scored. If the cup were used for most of the meals, the behavior with the cup would be scored.

h) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of the coordination of sucking, swallowing and breathing which could be scored as a -1 would include; panic or fear reactions with refusal to sequence two or more suck-swallows when longer sequences are present and do not cause respiratory difficulties.

i) Guidelines for Use of the Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the frequency or severity of interference with the coordination by abnormal patterns; the presence of skilled overlapping suck-swallow-breathing sequences for the bottle in a child who had not yet begun cup drinking; the occurrence of more advanced emerging behaviors; the degree of coordination present.

#11. COORDINATION OF SUCKING, SWALLOWING AND BREATHING

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child takes no liquids by mouth due to severe respiratory problems which interfere with feeding. Active choking and aspiration occur when liquids are given. |
| -8 | The child is not able to sequence 2 or more suck-swallow sequences from the bottle or cup, making evaluation of suck-swallow breathing coordination difficult to measure. |
| -7 | Marked respiratory distress occurs during feeding of liquids. The child may show poor sucking or swallowing with loss of liquid from mouth. Intake may be by tube feeding because of poor coordination of breathing and feeding. However, some liquids are taken by mouth. The respiratory difficulties are considered to be medically life endangering and the child may have experienced one or more instances of aspiration pneumonia. |
| -3 | a) Child is able to sequence 2 or more sucks from the bottle, breast or cup before pausing to breathe or swallow. Mild to moderate respiratory distress or respiratory incoordination is observed. Respiratory problems may be shown by the presence of clavicular breathing or by retraction at the jugular notch of the sternum, nasal flaring, etc.<br>OR<br>b) Child is not able to actively inhibit sucking and swallowing with the resultant respiratory distress or incoordination symptoms occurring when the cup or bottle is removed from the mouth. The child may not show problems with coordination for the initial segment of cup or bottle drinking. |
| -1 | The coordination of sucking, swallowing and breathing shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not take liquids due to gastro-intestinal disorders, structual disorders, delayed oral development due to prematurity or other medical or behavioral reasons not related to a primary sucking, swallowing or respiratory disorder. |
| 1 month | Child sequences 2 or more sucks from the bottle or breast before pausing to breathe or swallow. Breathing may become noisier during feeding. |
| 3 months | Long sequences of twenty or more sucks are present with the bottle. Swallowing follows sucking with no discernable pauses when the child is hungry and not looking around. Sucking motions occur almost simultaneously with swallowing (i.e., with overlapping motions). Pauses for breathing are infrequent. There may be occasional coughing or choking indicating poor timing of the suck-swallow pattern with breathing. |
| 6 months | Long sequences of sucking-swallowing-breathing are observed with the bottle. The child takes liquids from cup. During cup drinking many continuous sucks are observed which are not followed by coordinated swallowing. Much liquid is lost. Intake of larger mouthfuls of liquid may result in coughing and choking. |
| 9 months | Long sequences of continuous sucks which are not timed with swallowing may continue to occur. During cup drinking the child takes only one to three sucks before stopping or pulling away to swallow or breathe. Coughing, choking or sputtering may occur. |
| 12 months | Swallowing follows sucking with no pause as the child drinks from the cup. Some coughing and choking may continue to occur. Sequences of at least 3 suck-swallows occur when the child is thirsty. Intake during each suck-swallow is less than 1 ounce. |
| 15 months | Swallowing follows sucking with no pause as the child drinks from the cup. The pattern is well-coordinated with respiration and coughing and choking are rarely observed. The child is able to sequence at least 3 suck-swallows while drinking one ounce or more of liquid from the cup without major pauses. The child may continue to use a shorter suck-swallow sequence when not thirsty or interested in drinking. |

## #12. CONTROL OF DROOLING

### Testing Procedure

Observe drooling and the circumstances in which it occurs while evaluating the child's postural tone and movement and head control, when she is not engaged in major physical activity. If possible, the child should be observed in physical and occupational therapy sessions or school to obtain a full picture of drooling control with different types of activities. If swallowing motions cannot be seen visually, the examiner should place a finger lightly on the larynx and feel any laryngeal elevation which accompanies a swallow. If the child shows good control when she is not physically active, activities involving hand use, gross motor skills and speech should be observed. Because teething may be a large variable in drooling control in the infant, parents should be asked if the child is cutting any new teeth. Information from parent reports of drooling occurrence and frequency at home should be used, as well as observations made during and following feeding. Scoring should be based on the child's performance without physical or verbal reminders to control her drooling.

### Specific Scoring Information

a) Drooling is described as the loss of saliva from the mouth which occurs when the child is at rest, is moving, or is involved in fine motor activities. It may occur because of lack of head or body stability causing inefficient swallowing movements, major primary problems with sucking and swallowing, poor sensory feedback, or increased saliva production due to teething.

b) Frequency of drooling is often difficult to determine because it varies a great deal with head control, health, teething and motivation. Careful questioning of the parent will give some idea of the most frequent or consistent picture of drooling control seen at home. If drooling occurs only one time during the session in the position or situation observed, it may be described as occurring "rarely" or "inconsistently".

c) The degree of severity of drooling may be informally determined by the amount of saliva lost from the mouth and the frequency with which bibs or shirts must be changed by the parent or teacher to keep the child dry and presentable. When several changes of bibs are required per day, drooling would be considered "profuse".

d) A child who has little or no control of drooling when not teething should not be given a higher score simply because a new tooth is coming through. It is important to learn from the parents how much the teething has affected drooling control.

e) A child who does not drool should not be scored at a level higher than her overall physical abilities. For example, the child who does not move from one position to another (i.e., rolling, crawling, sitting up) should not be given a score of 9. The highest possible score would be 6 months or a score between 6 and 8 months.

f) The most advanced level of motor behavior which the child can perform within each category should be selected for scoring. For example, if the child is able to control drooling while cruising but not while walking, she would be scored on her control during cruising and would not receive a 15. A score of 9 or 10 would be given. General clinical judgments and standard age norms for acquisition of different motor tasks should be used in assigning a score to the child's level of physical development and control.

g) If the child is able to control drooling during single words or early word combinations, she should be scored at the 18-24 month level, if there is no drooling for the gross motor or fine motor tasks which are attempted. The child should not be penalized due to lack of walking, poor hand use, etc. If drooling occurs when gross or fine motor tasks are attempted, the child could not be scored above the 15-month level, even if no drooling was observed during speech.

h) Guidelines for Use of -1 Score: Some of the mildly abnormal components of the control of drooling which could be scored as a -1 would include: drooling during feeding which is extremely profuse; drooling in the conditions described under 1-24 months which occurs infrequently but in conjunction with the elicitation of abnormal oral reflexes (i.e., tongue thrust, jaw thrust, lip retraction).

i) Guidelines for Use of the Clinical Judgement Scores: Factors to consider when scoring a child between categories would include: the frequency or severity of the drooling; awareness of the drooling with swallowing attempts to correct the problem; the level of gross motor and fine motor skills in which drooling can be controlled; the occurrence of more advanced emerging behaviors.

#12. CONTROL OF DROOLING

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child has no control over drooling. No spontaneous swallowing motions can be observed. There is noticeable drooling under all conditions. May swallow if reminded. |
| -6 | Swallowing motions are observed. Moderate-to-profuse drooling occurs under the following circumstances:<br>a) Child shows a consistently wet face or bib under all conditions, including supine. Although child may be cutting teeth, problem does not appear to be primarily one of teething, since it has occurred during non-teething periods.<br>OR<br>b) Child is chronologically 2 years or older and continues to show moderate to profuse drooling under conditions in which head is upright or unsupported. Shirt front is wet or protective bib must be worn.<br>OR<br>c) Child shows profuse drooling while eating. Poor management of saliva production makes feeding messy or difficult. |
| -3 | Swallowing movements are observed. Drooling occurs inconsistently in all positions in which head is upright or unsupported, or occurs consistently but with mild or small amounts of saliva lost. Drooling occurs primarily during jaw thrusting. |
| -1 | Child's control of drooling shows mildly abnormal components which may or may not have been previously described. Or abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | (Not possible/appropriate to give this score for this behavior) |
| 1 month | a) Child is chronologically under the age of 3 months and shows no drooling.<br>OR<br>b) Drooling is rarely observed in a supine or reclining position. Drooling may be observed in sitting, prone, or standing. |
| 6 months | a) Child rarely drools in supine, prone, or sitting. Child may drool in these positions if babbling, or using hands for reaching, pointing or manipulating objects.<br>OR<br>b) Child is cutting teeth. Increase in drooling is noted in child who did not show consistent drooling prior to teething for activities listed under (a).<br>OR<br>c) Child drools only or primarily during or immediately after feeding or when given certain foods. |
| 9 months | a) Drooling does not occur when newly acquired gross motor skills are attempted. These include early movement sequences such as rolling, belly crawling, creeping on all fours and sitting up from supine or prone.<br>OR<br>b) Child is cutting teeth. Increase in drooling is noted in child who did not show consistent drooling prior to teething when newly acquired gross motor skills listed under (a) are attempted. |
| 15 months | a) Drooling does not occur when newly acquired gross motor skills are attempted. These include more advanced movement sequences such as cruising, walking and running.<br>OR<br>b) Child is cutting teeth. Increase in drooling is noted in child who did not show consistent drooling prior to teething when newly acquired gross motor skills listed under (a) are attempted. |
| 18 months | a) Drooling does not occur while the child is attempting early fine motor tasks. These include using the hands for feeding, undressing or play and single-word speech attempts.<br>OR<br>b) Child is cutting teeth. An increase in drooling is noted in a child who did not show consistent drooling prior to teething when attempting early fine motor skills. |
| 24 months | Drooling does not occur while child is attempting more advanced fine motor tasks. These include using hands for drawing or fine finger movements in play and in 2-3-word speech combinations. |

## AN APPROACH TO THE EVALUATION OF BITING AND CHEWING BEHAVIORS

### Basic Concepts

The development of biting and chewing skills represents the more volitional aspects of oral-motor development. Although both biting and chewing have their roots in early reflexive or automatic movement patterns triggered by stimulation of the gums and/or tooth receptors, they remain at a reflexive level for an extremely brief period. The Pre-Speech Assessment Scale is concerned primarily with the type of movement, development of skill and precision, and the grading of finely controlled movement of the jaw, tongue, and lips.

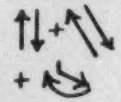
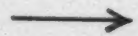
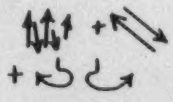
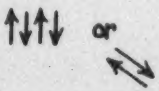
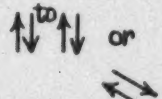
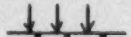
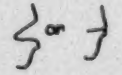
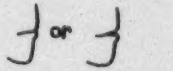
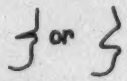
Because of the stress on the separation of oral components of jaw, tongue and lips, the Scale does not formally measure the extent to which the child integrates combined movements of the parts. Although this is indirectly measured at the higher levels of each subcategory, it is conceivable that a child could show early normal abilities of tongue movement, for example, but have difficulty integrating those movements with movements of the lips and jaw. The examiner should be aware of this limitation of measurement.

### Relationship to Pre-Speech and Communication Function

Relationships between biting and chewing behaviors and speech development are only speculative. The development of mature biting patterns requires fine adjustments in the amount of opening of the jaw and the controlled, graded movement to closure. Fine adjustments of strength or force of movement occur as feedback from past or current experience sets the amount of pressure exerted during the bite. Jaw movements become separated from body and head movements as they develop an independence of control and a precision in direction of biting force. Chewing patterns emphasize aspects of independence of tongue and lips from jaw patterns and the establishment of more precise control. Aspects of problem solving and motor planning are introduced as the child figures out how to retrieve or project a small piece of food to a particular location in the mouth.

Speech production involves high levels of independent movement and control of jaw, tongue, and lip movements. It involves the abilities to sequence these movements in a wide variety of ways depending upon the sequences of vowels and consonants involved. This, in turn, depends upon strong abilities in the motor planning area. It is conceivable that the major contributions to speech production of biting and chewing lie in these higher level movement skills. Unpredictable amounts and types of movement and force are required to succeed with biting and chewing tasks. The oral components must, of necessity, be variable and flexible and capable of rapid independent movements of parts as well as skillful combinations of movements and parts. These characteristics of movement are shared by biting and chewing and speech production.

MOVEMENT COMPONENTS IN THE DEVELOPMENT OF CHEWING ON A CONTINUUM OF NORMAL TO ABNORMAL

| Oral-Motor Component | Chewing | Munching | Sucking | Suckling | Phasic Bite | Tonic Bite | Tongue Thrust |
|---|---|---|---|---|---|---|---|
| Tongue |  (Up-down; side-to-center; center-to-side; side-to-side across midline) | (Up-down) | (Up-down) | (Extension - retraction) | (not involved) | (not-involved) |  (Forceful protrusion) |
| Jaw |  (Unstereotyped vertical; diagonal rotary; circular rotary) | (Stereotyped vertical; unstereotyped vertical) |  (Up-down; forward-backward) |  (Up-down; forward-backward) | (Stereotyped up-down or vertical) | (Exaggerated upward movement; difficulty with down) |  (not involved) |
| Teeth or Gums | (Contact; lateral or grinding movement; easy release of contact) |  (Contact; easy release of contact) |  (No contact) |  (No contact) | (Rapid contact with easy release) | (Hard, sustained contact; difficult release) |  (not involved) |
| Lips |  (Open or closed; may clean lips with incisors) | (Usually open; may clean lips with incisors) |  (Closed to semi-open; draws in lower lip with spoon) |  (Semi-open to open; no cleaning) |  (not involved) | (not involved) |  (not involved) |
| Significance for Chewing | Much variability of movement; separation of tongue and lips from jaw. | Beginning chewing pattern. May be built from tongue components of sucking and jaw and gum component of phasic bite. | Develops out of suckling as greater lip closure allows build-up of intra-oral sucking pressure. | Early infant feeding pattern. No separation of movements or parts. Total pattern of the "feeding organ". | Normal early reflex response to stimulation of the gums. | Interferes with jaw and gum components for phasic bite. | Interferes with tongue component for all feeding patterns. |

## IV. BITING AND CHEWING

### Common Definitions

The following definitions of terms apply to all or most of the categories in the Biting and Chewing Section. For purposes of conservation of space and increased clarity, they will be provided for the examiner only at the beginning of the section.

a) Munching is defined as the earliest form of chewing. It involves a flattening and spreading of the tongue combined with an up-and-down movement of the jaw. The body of the tongue may elevate slightly and make contact with the hard palate. The jaws make a definite biting or chewing rhythm. There is no movement of the tongue in a lateral direction to transfer the food to the teeth for real chewing. Munching appears to evolve from the combination of two earlier patterns; i.e., the tongue pattern seen in the true suck, and the jaw pattern seen in the phasic bite reflex. Munching remains an intermittent part of the adult chewing pattern and is observed at those times when the child is not transferring food.

b) Chewing is defined as the process of using the teeth and/or tongue in a movement designed to break up or pulverize solid pieces of food in preparation for swallowing. It is differentiated from sucking by differences in tongue and jaw movements. In chewing, the tongue shows greater spreading and rolling motion in an attempt to project the food between the teeth. In sucking (or suckling) the tongue pattern is a rhythmical extension-retraction pattern or a series of tongue elevations to the hard palate.

## IV. BITING AND CHEWING

### Common Scoring Information

The following scoring information applies to all of the categories in the biting and chewing sections. For the purposes of conservation of space and clarity they will be provided to the examiner only at the beginning of this section.

a) Varying degrees of hypotonicity or lower motor neuron paralysis or weakness can interfere with jaw, tongue, or lip movements during biting and chewing. In extreme cases of hypotonicity or flaccidity of major muscle groups, movement itself may be severely impaired. For example, the child may not be able to close the mouth to bite; alternation of jaw opening and closing for chewing may not be possible; there may be no active movements of the tongue or lips during chewing. In such cases a score of -9 would be given. When hypotonicity or muscle weakness is marked, but less severe, the effect on movement may still be observed but to a lesser extent or with intermittent frequency. Depending upon the frequency and the extent to which movement occurs, scores between -8e and -4e would be given. If chewing movements occur, but appear to be mildly or moderately reduced, or the hypotonicity interferes with needed stabilization of the jaw, a score of -3 would be appropriate. -1 scores would be given for behaviors described in the Guidelines for Use of -1 Score in each section.

#13. JAW MOVEMENT IN BITING

Testing Procedure

Observe the child's jaw movements while biting a soft cookie such as an animal cracker, a bread sandwich, and a hard or firm cookie such as the Gerber Firm Baby Cookies or the large toddler pretzels. Biting patterns should not be checked until the child has reached a chronological age of 5 months. If the child is developmentally below 5 months, the examiner should use discretion in deciding whether testing with solids could be physically dangerous. Presentation of the cookie for biting should be held constant. Soft materials should be presented slightly to the right or left of center in the canine or lateral incisor area. Testing must be done on both sides. Hard cookies or large hard pretzels should be presented in either the canine or molar area. The exact area of presentation may depend on the child's individual problems. For example, presence or absence of teeth in given areas, malocclusions, or the triggering of head-turning and an abnormal tonic reflex with presentation on the side may make some adaptations necessary. Any changes in the standard procedure should be noted in the Comment Section on the score sheet. If the child does not show abnormal reflex patterns while biting and is able to bite without associated reactions, finer aspects of jaw grading should be tested. Food of different thicknesses should be presented to see if the child can visually and kinesthetically adjust the amount of mouth opening to the appropriate size. Examples of foods to use might include: thin pretzel, cracker, sandwich cookie, thicker sandwich, very thick pretzel. At least 3 different thicknesses should be presented from the general distinctions of wide opening, medium opening and small opening of the mouth.

Specific Scoring Information

a) A jaw thrust is defined as a strong downward extension of the lower jaw when food is presented for biting. The strength and tension involved differentiate the jaw thrust from the normal full opening of the jaw which often occurs in young infants. These lesser problems of jaw grading should not be misidentified and classified as a jaw thrust.

b) A tonic bite reflex is defined as a strong closure of the jaw when the teeth or gums are stimulated.

c) The phasic bite reflex is a rhythmical bite-and-release pattern seen in a series of jaw openings and closings which occur when the teeth and gums are stimulated.

d) Jaw clenching is defined as the tight involuntary closure of the jaw making jaw opening difficult. It is important to determine that the clenching of the jaw does not occur only as a behavioral way of refusing food.

e) Excessive jaw retraction is defined as the pulling back of the lower jaw so that the molars do not make proper contact for a bite. For purposes of this definition, structural orthodontic problems of a retracted or retruded mandible are not included. Included here is only the retraction of the mandible on the basis of changeable muscle forces.

f) Structural malocclusions refer to misalignments of the teeth, jaw structures, etc., which are more permanent and could only be changed by surgery or orthodontistry.

g) Jaw deviation is defined as the pulling of the lower jaw in a forward, or lateral direction through changeable muscle forces.

h) Grading of jaw movements is defined as the ability to vary the opening of the mouth in small amounts that are appropriate for biting foods of different thicknesses. This is developed as a type of visual orientating response based on the child's visual ability to recall the kinesthetic feedback from opening the mouth for various sizes or thicknesses of food.

i) The presence of overflow or associated movements is seen in the increase in tension and patterns of extension or flexion in the arms or legs or head as the child exerts greater effort in biting through the hard cookie. Associated reactions involving marked increases in hypertonicity in abnormal reflex patterns would be given a -1.

j) To receive credit for a controlled sustained bite, the child's teeth should close on the food, biting through it gradually. This is followed by an easy release of the food for chewing. The jaw does not snap closed suddenly on the food. Observe whether the child actually bites through the food or whether he or she simply holds it while the person doing feeding breaks it off into his or her mouth.

k) A child under 5 months of age should be scored as a "0" and should not be scored a -9 even if interfering tonic reflex patterns occur.

l) Ability to bite on right and left sides should be compared. If there is an asymmetry of function, with one side showing poorer control, the abnormal score should reflect performance on the poorer side. If double scoring is appropriate (i.e. 75% normal function on at least one side), the normal development score would be based on performance on the better side. For example, controlled bite is obtained when biting on left side. Biting on right side triggers a jaw thrust 40-50% of the time. Child should be given a double score of -6b (right side) and 12 months (left side).

m) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of jaw movement in biting which could be scored as a -1 would include: limitation in the amount of jaw opening structurally possible due to problems with the temporomandibular joint; interference with the bite by a tongue thrust; deviation of the lower jaw forward or to one or both sides during attempts to bite; structural problems of malocclusion which interfere with biting; inability to obtain a sustained bite through soft foods but ability to bite when more resistance is given by firmer foods; dislike of biting due to oral hypersensitivity; associated reactions with strongly abnormal postural tone and movement.

n) Guidelines for Use of the Clinical Judgment Score: Factors to consider when scoring a child between categories would include: the frequency or severity of interference with biting by abnormal patterns; the extent of associated movements or head extension during biting; the occurrence of more advanced emerging behaviors; the speed and precision of the bite.

#13. JAW MOVEMENT IN BITING

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child shows no biting of food because of interference by abnormal movement patterns of the jaw such as jaw thrust, jaw clenching, excessive jaw retraction or tonic bite reflex, or severe hypotonicity or flaccidity making active jaw closure impossible. |
| -8 | Biting occurs when food is presented between the gums or teeth. Abnormal movement patterns of the jaw occur more than 50% of the time when food is presented. This interference is caused by:<br>a) Excessive jaw retraction.<br>OR<br>b) Jaw thrust.<br>OR<br>c) Tonic bite reflex.<br>OR<br>d) Involuntary movement or tremor.<br>OR<br>e) Marked hypotonicity or muscle weakness.<br>OR<br>f) Jaw clenching or tooth grinding. |
| -6 | Some biting occurs when food is presented for biting. Abnormal movement patterns of the jaw occur less than 50% of the time when food is presented. This interference is caused by:<br>a) Excessive jaw retraction.<br>OR<br>b) Jaw thrust.<br>OR<br>c) Tonic bite reflex.<br>OR<br>d) Involuntary movement or tremor.<br>OR<br>e) Marked hypotonicity or muscle weakness.<br>OR<br>f) Jaw clenching or tooth grinding. |
| -3 | The child shows difficulty biting through soft or hard foods due to mild hypotonicity or lack of power in the jaws or inability to stabilize the jaw long enough to bite through. |
| -1 | Jaw movement patterns in biting show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | The child is under 5 months of age or does not make any attempt to bite the food. Sucking, suckling, or a complete lack of response is observed. However, there are no abnormal oral patterns of the jaw which would interfere with the biting process. Abnormal oral patterns of the tongue or lips may be present and may interfere with biting development. |
| 5 months | Uses a primitive phasic bite and release pattern on a softer cookie. There is a relatively regular biting rhythm and lack of a sustained controlled bite through the cookie. Pieces of cookie may come off and the child may occasionally use a sucking or suckling pattern instead of an attempted bite. |
| 9 months | Holds the soft cookie between the gums or teeth without biting through. Maintains a quiet jaw and holding posture as the feeder assists in breaking off a piece. May revert to a primitive phasic bite pattern or sucking. |
| 12 months | Uses a controlled, sustained bite on a soft cookie. When biting a hard cookie, the bite may be unsustained because of lack of teeth or biting power. The child may revert to the primitive phasic biting pattern or sucking. |
| 18 months | Uses a controlled, sustained bite on a hard cookie, but shows presence of overflow or associated movements in the arms or legs or head extension and pulling away to assist with the biting. |
| 21 months | Uses a controlled, sustained bite on a hard cookie with no overflow or associated movements in the arms or legs. The head does not extend to assist in biting. When the food is presented on the side for biting, child may turn head in the direction of the food. A full open mouth position may be used in preparation for biting food of different thicknesses. |
| 24 months | Uses a sustained controlled bite while keeping the head in midline when food is presented on both sides. Child is able to grade the opening of the jaw appropriately when asked to bite food of different thicknesses. |

#14. JAW MOVEMENT IN CHEWING

Testing Procedure

Observe the child's chewing of solid table foods, cookies and raisins in other portions of the evaluation. In addition, use meat or other food requiring grinding action of the teeth for the child who has some rotary jaw movements. Chewing patterns should not be checked until the child has reached a chronological age of 6 months. If the child is developmentally below 6 months, the examiner should use discretion in deciding whether testing with solids could be physically dangerous. Presentation of the materials for chewing should be between the biting surfaces of the teeth or gums in the canine or molar area. Food should be presented on both the right and left sides, particularly if the child is unable to use his tongue to assist in transferring food from side to side.

Specific Scoring Information

a) A jaw thrust is defined as a strong downward extension of the lower jaw which occurs as solid food rests in the mouth or during chewing attempts. The strength and tension involved differentiate the jaw thrust from the normal wider opening of the jaw which often occurs in young infants. These lesser problems of jaw grading should not be misidentified and classified as a jaw thrust. In a true jaw thrust, during chewing, the child may appear to be stuck in a mouth-open position and may lose food and saliva during the thrust.

b) A tonic bite reflex is defined as a strong closure of the jaw when the teeth or gums are stimulated. During chewing this may occur as the child's upper and lower teeth make contact or as a very firm piece of food is encountered in chewing. It may be seen in difficulities in opening the mouth or lowering the jaw during chewing.

c) Jaw clenching is defined as the tight, involuntary closure of the jaw, making jaw opening difficult. This may be related to the presence of a tonic bite reflex, but is differentiated from it in that it may be a part of a picture of lip and/or jaw retraction.

d) Excessive jaw retraction is defined as the pulling back of the lower jaw so that the molars do not make proper contact during chewing. For purposes of this definition, structural orthodontic problems of a retracted or retruded mandible are not included. Included here is only the retraction of the mandible on the basis of changeable muscle forces.

e) Tooth grinding is defined as the tense movement of clenched teeth grinding or scraping against each other which often produces an abrasive, irritating sound.

f) Jaw protrusion or lateral deviation is defined as the pulling of the lower jaw in a forward or lateral direction through changeable muscle forces. Structural orthodontic problems are not included within the definition.

g) A phasic bite pattern is a rhythmical bite-and-release pattern seen in a series of small jaw openings and closings which occur when the teeth and gums are stimulated.

h) Non-stereotyped vertical movement is defined as a chewing pattern which contains up and down jaw movements which are variable in degree of jaw opening and timing of opening and closure.

i) Diagonal-rotary movements of the jaw are defined as movements of the jaw which either begin at midline and move in a simultaneous downward-lateral direction (diagonal) or movements which begin with the jaw in a lateral position and move in a downward-central direction (diagonal). These movements of the jaw accompany tongue movements which transfer food from the center to the side or from the side to the center. To be scored as a type of rotary movement, the movement should be smooth and not a jerky, pulling or lateral deviation of the jaw.

j) Circular-rotary movements of the jaw are defined as movements of the jaw which have a circular or semi-circular component to them. The jaw moves from center to one side and then rapidly crosses mid-line and moves to the opposite side. This movement accompanies transfer of food from one side across mid-line to the opposite side. It may also be used in a grinding of the food by the molars without tongue transfer.

k) A child under 6 months of age should be scored as a "0" and should not be scored a -9 even if interfering tonic reflex patterns occur.

l) Ability to chew on right and left sides should be compared. If there is an asymmetry of jaw function with one side showing poorer control, the abnormal score should reflect the performance of the poorer side. If double scoring is appropriate (i.e., 75% normal function on at least 1 side), the normal development score would be based on performance of the bettew side. For example, when chewing on left side, child triggers strong jaw thrust or tonic bite reflex nearly every time. However, when chewing on right side, phasic bite-and-release pattern occurs more than 75% of the time. Child should be given double score of -8c (left side) and 5 months (right side).

m) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of jaw movement in chewing which could be scored as a -1 would include: limitation in the amount of jaw opening structurally possible due to problems with the temporomandibular joint; ability to chew only firmer tougher foods which give more resistance; use of an abnormally wide jaw excursion during chewing.

n) Guidelines for Use of the Clinical Judgment Score: Factors to consider when scoring a child between categories would include: the frequency and severity of interference with chewing by abnormal patterns; the smoothness and precision in the use of rotary jaw movements; the occurrence of more advanced emerging behaviors.

#14. JAW MOVEMENT IN CHEWING

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child shows no chewing of food. There is a contributing influence of abnormal movement patterns of the jaw such as jaw thrust, jaw clenching or tooth grinding, excessive jaw retraction, tonic bite reflex, or severe hypotonicity or flaccidity making active jaw closure or opening impossible. |
| -8 | Munching or chewing occurs when solid food is placed in the mouth without biting. Abnormal movement patterns of the jaw occur more than 50% of the time. This interference is caused by:<br>a) Excessive jaw retraction.<br>OR<br>b) Jaw thrust.<br>OR<br>c) Tonic bite reflex.<br>OR<br>d) Involuntary movement or tremor.<br>OR<br>e) Marked hypotonicity or muscle weakness.<br>OR<br>f) Jaw clenching or tooth grinding.<br>OR<br>g) Excessive jaw protrusion or lateral deviation. |
| -6 | Munching or chewing occurs when solid food is placed in the mouth without biting. Abnormal movement patterns of the jaw occur less than 50% of the time. This interference is caused by:<br>a) Excessive jaw retraction.<br>OR<br>b) Jaw thrust.<br>OR<br>c) Tonic bite reflex.<br>OR<br>d) Involuntary movement or tremor.<br>OR<br>e) Marked hypotonicity or muscle weakness.<br>OR<br>f) Jaw clenching or tooth grinding.<br>OR<br>g) Excessive jaw protrusion or lateral deviation. |
| -3 | The child appears to have lack of power in the jaw or mild hypotonicity in the jaw closing muscles or lack of jaw stability which interferes with the closing-grinding phase of chewing. |
| -1 | Jaw movement patterns in chewing show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | The child is under 6 months of age; or the child does not make any attempt to munch or chew the food. Sucking, suckling, or a complete lack of response is observed. However, there are no abnormal movement patterns of the jaw which would interfere with the chewing process. Abnormal movement patterns of the tongue or lips may be present and may interfere with chewing development. |
| 5 months | Jaw movement in chewing is primarily the primitive phasic bite-and-release pattern with a fairly regular stereotyped rhythm. Diagonal-rotary movements may occur as food is transferred to the side or middle of the mouth. Non-stereotyped vertical movements may occur intermittently. |
| 6 months | Jaw movement in chewing is primarily a non-stereotyped vertical movement. The up-down pattern is more variable and less automatic than that described as a phasic bite-and-release pattern. Diagonal-rotary movements or phasic bite-and-release movements may occur. |
| 9 months | Jaw movement in chewing is primarily a non-stereotyped vertical movement. Diagonal-rotary jaw movements occur as food is transferred to the side or middle of the mouth by the tongue. The phasic bite-and-release pattern may be observed occasionally if the child is chewing food between the upper and lower central incisors. |
| 15 months | Jaw movement is a mixture of unstereotyped vertical and diagonal-rotary movements. Diagonal-rotary movements occur as food is transferred to the sides and to the center. Rotary jaw movements are smooth and well-coordinated. |
| + 24 months | Jaw movement in chewing is primarily a non-stereotyped vertical movement. Some diagonal-rotary jaw movements are observed. Circular-rotary jaw movements occur as the child transfers food across midline from one side of the mouth to the other. |

#15. TONGUE MOVEMENT IN CHEWING

Testing Procedure

Observe the child while chewing table foods of different consistencies, cookies or graham crackers and raisins. Chewing of solids should be checked when the child reaches the chronological age of 6 months. If the child is developmentally below 6 months, the examiner should use discretion in deciding whether testing with solids could be physically dangerous. If precise tongue-tip movement is not observed, but the child consistently shows a rolling lateralization of the tongue, use a small, firm, crisp food such as Grape Nuts. Primary observations of the child's ability to lateralize the tongue and transfer food in the mouth should be made with either raisins or firm pieces of hot dog or similar meat. Place the raisin between the molars on both the right and left sides. Observe whether the tongue lateralizes to that side. Then place a raisin in the center of the tongue to observe whether the child can transfer it to both the right and left sides. Finally, place the raisin on the left side and demonstrate to the child that you want the raisin to move to the right side. Then place the raisin on the right side and demonstrate transfer to the left. Each situation should be done at least 3 times to observe how well, consistently, and precisely the child is able to move the tongue during chewing.

Specific Scoring Information

a) A tongue thrust is defined as a forceful protrusion of the tongue from the mouth. It is generally a stronger movement than the extension-retraction movement seen in the infantile suckling pattern. The tongue often appears thick or bunched during the thrust. The thrusting of the tongue may make it difficult to place food between the teeth for chewing, or may cause the food to be ejected from the mouth.

b) Tongue retraction is defined as the strong pulling back of the tongue into the pharynx. The tongue may be depressed with the back elevated and bunched. The tongue is usually rather immobile on the floor of the mouth with no tip elevation or lateral movements.

c) Suckling is defined as the early infantile method of sucking which involves a definite extension-retraction movement of the tongue. There is frequently a rather loose approximation of the lips. Although this pattern becomes continuously reduced in frequency with the development of skilled chewing, the child may revert to it briefly in difficult or demanding situations.

d) Strong hypersensitivity of the anterior half of the tongue may interfere with chewing by triggering a gag, crying, rejection of the food or an immediate swallow of the food without chewing in order to avoid the discomfort of holding it in the mouth.

e) Lateralization is the movement of the tongue to the side of the mouth in an attempt to project the food between the teeth for chewing. This is accomplished in a variety of ways. The child may use a simple horizontal shift of the body of the tongue with no elevation of the center of the tongue. A gross tipping or rolling movement in sliding or shifting the food to the side may be used. The side of the tongue toward the food transfer is lowered or depressed while the opposite side is elevated or raised. This causes a slide effect which moves the food from the center toward the lowered side. A more skilled type of transfer involves the active separation of the front 1/3 of the tongue in the formation of a tongue tip. The tip then elevates independently from the jaw and the rest of the tongue and projects food to the desired side. Tongue lateralization is frequently accompanied by diagonal-rotary or circular-rotary jaw movements.

f) Precise tongue-tip movements may be observed as the child gains greater skill in chewing. Tongue movements appear to occur more rapidly. Often the front of the tongue will narrow into a skilled point which assists in skillful projection and manipulation of small pieces of food.

g) In order for a child to be described as munching, both the tongue and jaw components must be present at least intermittently. The tongue must show some flattening and elevation at the same time as a rhythmical or non-rhythmical biting pattern occurs. A few children will show a mixture of phasic bite rhythm and an in-and-out suckle pattern of the tongue. This would not be considered munching. Such a child would be scored as a non-chewer and given a "0" or "X". If, however, the munching pattern was observed and the tongue still retained some suckling type movements when not munching, the child would be scored at a level between 6 months and 24 months.

h) Ability to chew on right and left sides should be compared. If there is an asymmetry of tongue function with one side showing poorer control, the abnormal score should reflect performance of the poorer side. If double scoring is appropriate (i.e., 75% normal function on at least 1 side), the normal development score would be based on performance of the better side. For example, when food is placed between molars on right side, tongue shows strong involuntary tremors. When food is placed on left side, tongue lateralizes toward the food. Child would be given a double score of -8d (right side) and 7 months (left side).

i) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of tongue movement in chewing which could be scored as a -1 would include: mild tongue deviations during munching which could not be considered true lateral movements; extreme variability in the ability to munch or chew depending upon the consistency of the food presented; unusual dependence upon lateral jaw movements in transferring food to the side; unusual tongue thickness associated with tension or hypotonicity; short lingual frenulum.

j) Guidelines for Use of the Clinical Judgment Score: Factors to consider when scoring a child between categories would include: the frequency and severity of interference with chewing by abnormal patterns; the smoothness and precision of tongue lateralization and food transfer; the amount and circumstances triggering extension-retraction patterns of the tongue; the occurrence of more advanced emerging behaviors.

#15. TONGUE MOVEMENT IN CHEWING

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child shows no chewing of food. There is a contributing influence of abnormal movement patterns of the tongue such as tongue thrust, tongue retraction, strong hypersensitivity of the anterior half of the tongue, or hypotonicity or flaccidity of the tongue making tongue movement difficult or impossible. |
| -8 | Some munching or chewing occurs when solid food is placed in the mouth. Abnormal movement patterns of the tongue occur more than 50% of the time when food enters the mouth without biting or during chewing. This interference is caused by:<br>a) Tongue retraction.<br>OR<br>b) Tongue thrust.<br>OR<br>c) Strong hypersensitivity of the anterior half of the tongue.<br>OR<br>d) Involuntary movement or tremor.<br>OR<br>e) Marked hypotonicity or muscle weakness. |
| -6 | Some munching or chewing occurs when solid food is placed in the mouth. Abnormal movement patterns of the tongue occur less than 50% of the time when food enters the mouth without biting or during chewing. This interference is caused by:<br>a) Tongue retraction.<br>OR<br>b) Tongue thrust.<br>OR<br>c) Strong hypersensitivity of the anterior half of the tongue.<br>OR<br>d) Involuntary movement or tremor.<br>OR<br>e) Marked hypotonicity or muscle weakness. |
| -3 | The tongue appears passive or hypotonic, with movement during chewing mildly to moderately reduced. |
| -1 | Tongue movements in chewing show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | The child is under 6 months of age; or the child does not make any attempt to munch or chew the food. Sucking, suckling or a complete lack of response is observed. However, there are no abnormal movement patterns of the tongue which would interfere with the chewing process. Abnormal movement patterns of the jaw or lips may be present and may interfere with chewing development. |
| 6 months | The tongue shows predominantly a munching pattern and no lateralization of the tongue with solid foods. Sucking or suckling movements may alternate with the munching pattern. |
| 7 months | The tongue begins to show some lateralization with a gross rolling movement or simple horizontal shifts when food is placed between the biting surfaces in the molar area. The tongue is able to move to the side in this manner but may revert to a suckling pattern when food is placed in the center of the tongue or needs to be transferred from side to side. Movement to both sides may not be seen. |
| 9 months | Lateral movements of the tongue continue when food is placed on the sides and are beginning to occur in transferring food from the center to the side. This may not be seen with nigh frequency nor to both sides. Intermittent extension-retraction movements may continue in conjunction with a transfer movement which is difficult. |
| 12 months | When food is placed in the center of the tongue, the child is able to transfer it to both sides with tongue movements. Intermittent extension-retraction movements may continue in conjunction with a transfer movement which is difficult. |
| 24 months | When food is placed between the biting surfaces of the molars, the tongue transfers it to the other side. Transfer of food across midline occurs when food is placed on both sides of the mouth. The child may show a preference or greater skill on one side. Movements may be slow or gross. Midline transfers are spontaneous and automatic. Greater difficulty or failure to transfer may occur when the child attempts to transfer volitionally on command. Extension-retraction movements occur intermittently. |
| + 24 months | Food can be transferred from center-to-side and from side-to-side across midline with equal skill. The child can do this rapidly and with some skill. Speed and skillfulness may not be consistent. He or she may be able to transfer food across midline on command. Precise movements involving the elevated tongue tip may be observed. Extension-retraction movements do not occur. |

#16. LIP MOVEMENT IN CHEWING

Testing Procedure

Observe lip movement as the child is chewing a cookie. Place cookie crumbs on both the upper and lower lips and observe whether the child uses teeth and lip movement to clean the lips. Lip action should also be observed in any other chewing tasks given the child during evaluation.

Specific Scoring Information

a) Lip retraction is defined as the drawing back of the lips so that they form a tight line over the mouth. In this position it becomes difficult for the lips to assist in keeping food within the mouth during chewing.

b) Lip purse-string action is defined as a compensation for lip retraction in which the child appears to counteract the basic pattern of pulling back by pursing his lips forward. The result is a tight semi-retracted pattern in which the orbicularis oris muscle surrounding the lips seems to be contracting in a drawstring type of action as is seen in cloth purses with a drawstring. The lips have a puckered look and are both rounded and retracted.

c) Upper lip movement develops gradually in the normal child. As the child first begins to chew the upper lip is somewhat passive; however, it never is totally inactive or hypotonic looking. The lower lip moves actively with the lower jaw and there is some mechanical contact with the upper lip or gums as the baby begins to chew. When the lips appear abnormally passive and/or hypotonic with little or no contact or movement of either the upper or lower lip, the child should receive an abnormal score.

d) Difficulty with lip control during chewing may be indicated by various mechanical means which some children use as compensations. The use of head extension may prevent the food from falling out because of poor lip closure. The use of excessive cleaning of the lips with the tongue may be seen in a child with poor lip closure but a more normal tongue. The hands or fists may be used to push food back into the mouth. The presence of these and other compensations should be a signal to the examiner to carefully evaluate for the presence of abnormal patterns of lip control.

e) The differences between a pulling-in of the lips and cleaning of the lips is primarily one of the amount of activity involved and the effectiveness of the maneuver. When the lips are drawn in (score of 6 months) they prepare for the next step of active cleaning by the incisors or gums (score of 12 months). When drawn in there may be no contact with the opposite gums or teeth. The food which stimulated the inward movement usually remains on the lip. When there is active cleaning there is contact of the lips with the gums or teeth and some success in removing the food.

f) A score of 18 months requires that the child chew with the lips closed as needed. This implies that the examiner must provide the opportunity for the child to do so. If the child does not spontaneously stuff his or her mouth very full or provide other situations requiring lip closure, the examiner should do this.

g) Ability to chew on right and left sides should be compared. If there is an asymmetry of lip function with one side showing poorer control, the abnormal score should reflect the performance of the poorer side. If double scoring is appropriate, (i.e., 75% normal function on at least 1 side), the normal development score would be based on performance of the better side. For example, when food is placed on left side of mouth, lips are totally passive and appear to be hypotonic. When food is placed on right side, the corner of the mouth tightens. Child would be given a double score of -8e (left side) and 6 months (right side).

h) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of lip movement in chewing which could be scored as a -1 would include: interference with cleaning movements by abnormal movement patterns of the jaw or tongue; interference with upper lip activity or mechanical lip contact by excessive jaw movement; lax or hypotonic cheeks which do not work efficiently in keeping food out of the buccal cavity.

i) Guidelines for Use of the Clinical Judgment Score: Factors to consider when scoring a child between categories would include: the frequency or severity of interference with chewing by abnormal patterns; the smoothness and precision of lip and cheek activity in keeping food within the mouth; the precision of cleaning movements and the degree of smooth integration of these movements with chewing; the amount and frequency of food or saliva loss; the occurrence of more advanced emerging behaviors.

#16. LIP MOVEMENT IN CHEWING

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child shows no chewing of food. There is a contributing influence of abnormal movement patterns of the lips such as lip retraction, purse-string action, or severe hypotonicity or flaccidity making lip movement impossible. |
| -8 | Munching or chewing occurs when solid food is placed in the mouth. Abnormal movement patterns of the lips occur more than 50% of the time when food is placed in the mouth without biting or during chewing. This interference is caused by:<br>a) Lip retraction.<br>OR<br>b) Lip purse-string action.<br>OR<br>c) Hypersensitivity with startle as food is on the lips.<br>OR<br>d) Involuntary movement or tremor.<br>OR<br>e) Marked hypotonia or muscle weakness. |
| -6 | Munching or chewing occurs when solid food is placed in the mouth. Abnormal movement patterns of the lips occur less than 50% of the time when food is placed in the mouth without biting or during chewing. This interference is caused by:<br>a) Lip retraction.<br>OR<br>b) Lip purse-string action.<br>OR<br>c) Hypersensitivity with startle as food is on the lips.<br>OR<br>d) Involuntary movement or tremor.<br>OR<br>e) Marked hypotonia or muscle weakness. |
| -3 | Lips remain open during chewing and appear passive or hypotonic with little or no movement, even though the lower jaw moves. |
| -1 | Lip movement patterns in chewing show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | The child is under 6 months of age; or the child does not make any attempt to munch or chew the food. Sucking, suckling or a complete lack of response is observed. However, he does not show any abnormal movement patterns of the lips which would interfere with the chewing process. Abnormal movement patterns of the jaw or tongue may be present and may interfere with chewing development. |
| 6 months | The child has some munching or chewing patterns. There is a slight drawing in of either the upper or lower lip or a tightening of the corner of the mouth when food is on the lips. The teeth or gums are not used to actually clean the food from the lips. |
| 9 months | The lips are active with the jaw and make some mechanical contact at the sides or in the center as the jaw moves up and down. The upper lip comes forward and down in an active manner during chewing. The upper or lower lip draws in when food is on the lips. |
| 12 months | The lips are active in chewing. The child uses his incisors or gums to clean food from the lower lip as it is drawn inward. There may be loss of food or saliva while chewing. |
| 15 months | The upper and lower lips are active in chewing and cleaning. The corner of the lip or cheek draws inward and assists in controlling placement or movement of food in the mouth. |
| 18 months | The child is capable of chewing with his lips closed and does so intermittently. The lips may be closed for chewing only when he has stuffed his mouth and is in danger of losing food. There may be some loss of food or saliva while chewing. |
| 24 months | The child shows adequate lip movement during chewing and does not lose any food or saliva from the mouth while chewing. He is capable of chewing with his lips closed although he may not do so consistently. |

## AN APPROACH TO THE EVALUATION OF RESPIRATORY-PHONATORY BEHAVIORS

### Basic Concepts

The respiratory-phonatory system can be considered a single integrated system in the production of a sound source for speech. Although respiration can be observed and measured in isolation, differences between vegetative breathing and speech breathing make the measurement of quiet breathing patterns (in a scale purporting to measure pre-speech behaviors) questionable. Respiration is viewed as a pump which drives the phonatory system. However, it is the timing and coordination of the pump and air stream (i.e., subglottal air pressure) with vocal fold activity which is most important. Preliminary research and clinical experience indicates that the underlying problem of most children with cerebral palsy is in the control of the air stream, not in the adequacy of the respiratory pump per se.

The Pre-Speech Assessment Scale emphasizes the ability of the total respiratory-phonatory system to control the air stream to develop phonatory features of initiation, duration, loudness, intonation, and quality which give meaning and richness to speech production.

The adequacy of control of subglottal air pressure varies in the cerebral palsied child with two aspects of complexity. As the system must deal with more complex demands for physical coordination of the articulators and with the added rules and restraints of linguistic features, breakdowns occur in respiratory-phonatory control. Thus, a child may produce near-normal voice quality and adequate duration of phonation when producing random non-meaningful vowels. As the physical complexity is increased by the addition of articulatory valving for consonants (i.e., producing single CV syllables) or by the need to sequence a series of consonant-vowel combinations (i.e., CVCV syllables), control of the respiratory-phonatory system may be reduced. The child may now have difficulty with onset of phonation or with a breathy or tight vocal quality. Slow articulatory valving in a repeated or reduplicated pattern may place added demands on the duration of phonation and a child with adequate duration for single vowels, may show inadequate duration as consonants are added.

In a similar manner, the addition of meaningfulness or communicative intent may also reduce the efficiency of the respiratory-phonatory system. A child who freely babbled strings of consonants and vowels with no difficulties in voice onset, may experience laryngeal blocs or strained, strangled phonation when attempting to utilize many of the same consonant-vowel sequences in meaningful words. The more automatic the production, the more likely it is to be produced with normal features of phonation.

The Respiratory-Phonatory section of the Pre-Speech Assessment Scale is built upon the premise that increases in structural complexity and meaningfulness may affect the child's skill in the use of phonation. This hypothesis has never been formally tested in normal children. Since normal children would be limited by less severe movement control difficulties than cerebral palsied children, its influence is not as obvious.

### Relationship to Pre-Speech and Communication Function

One may speculate that the infant and young child randomly and systematically explores and varies those components of phonation which will carry maximum possibilities for meaningful expression. Developing control of the vocal folds in regulation of voice onset time contributes to production and perception of voiced and voiceless consonants. Adequate duration of phonation allows the child to produce long and complicated sentences. It allows her to continue a monologue or dialog for hours at a time without fatigue. Limitations in this area may indirectly reduce the length of the child's utterance and artificially suppress the grammatical complexity as the child attempts to function within her limited production system. Variations in loudness will later be used as a key element in regulating stress patterns in words and sentences and in carrying important elements of meaning. Pitch characteristics contribute to the listeners perception of gender and sexuality. When abnormally high in infancy, they may contribute to an increased level of irritability in the child's caretaker. This may affect the non-verbal interaction and communication between the baby and her parents. The ability to vary pitch levels and intonation patterns contributes to the development of grammatical and semantic contrasts, to the communication of attitudes or personal emotions, and to certain socio-linguistic features. Vocal quality contributes to the psychological pleasantness of the voice to the ease with which phonation can be continued in long dialogues without fatigue, to certain psychological perceptions which the listener may make about a speaker, and to the risk of physical abuse to the vocal folds.

## V. RESPIRATION-PHONATION

### Common Definitions

The following definitions of terms apply to all or most of the categories in the Respiration-Phonation Section. For purposes of conservation of space and increased clarity, they will be provided for the examiner only at the beginning of this section.

a) Phonation is defined as the production of voiced sound caused by a column of air moving upward in the trachea meeting a pair of vocal folds pulled together to interrupt the air flow. The balance between these two forces results in phonation which can be adjusted in pitch, intensity and quality.

b) Crying is defined as a sustained or intermittent vocal sound which expresses a child's basic emotions or the communication of hunger, anger, fear, pain or desire to be picked up by the caregiver.

c) Distress vocalization or fussing is a less active form of crying which shares many of its features. Since it differs from crying primarily in the feature of duration, it should not be included within the testing of duration of phonation. It may be considered a form of cry behavior for all other sections.

d) Non-crying phonation is defined as the production of voiced sound in the more positive emotional reactions of squealing, laughter, chuckling, vowels, single consonant-vowel syllables, sequenced consonant-vowel combinations, words, phrases, and sentences.

e) Non-speech phonation is defined as any vocalization which the child produces which would not be considered a word, phrase or sentence. This would include crying, distress, laughing, squealing, pleasurable vocalizations without the clear-cut quality of a vowel or consonant, vowels, single consonant-vowel syllables, or sequenced consonant vowel combinations.

f) A vowel is a continuous sound which is produced by resonance in a relatively open cavity or tract. Vowels are always voiced and produced with some degree of mouth opening. English vowels are all produced with elevation of the soft palate so that the vocal tone is emitted from the mouth rather than the nose. Vowels may occur as a single sound or unit or may occur in long broken or unbroken strings with the presence of syllabification, stress, and intonation patterns.

g) A consonant is a speech sound produced with or without voicing by contraction of the tongue, lips, palate and pharynx in such a way that the air stream or vocal tone is interrupted or obstructed.

h) A single consonant-vowel syllable is defined as the presence of a syllable containing a minimum of one consonant and one vowel (CV). The syllable may also have variations which include the addition of a second consonant at the end of the syllable (CVC) or the initiation of the syllable with a vowel (VC). The term,syllable, implies specific timing relationships and constraints on the relationship of openings and closures. In the early stages in which a consonant and vowel are combined (i.e., in the development of alternation of full opening and closure of the vocal tract) the timing aspects of the syllable have not yet developed. This stage of early development has been referred to as marginal babble (Oller). For ease of scoring, the term CV syllable will be used in the Scale to refer to the single combining of a consonantal element with a vowel element whether or not the timing constraints of the syllable have been developed.

These syllables may be produced with a simple chaining of syllables and a fairly even rhythm and flat or falling intonation pattern. Or they may occur as a long succession of syllables which have stress and intonation patterns resembling meaningful speech. The latter jargon-like patterns often appear to be the child's attempt to give some flow or continuity to adult-like speech attempts in connecting the few words he can produce.

i) Sequenced consonant-vowel combinations is defined as the sequencing or chaining of two or more consonant-vowel syllables (CVCV) with a timing which more closely resembles the syllables of speech. The syllables may contain a repetition or reduplication of the same syllables ($C_1V_1C_1V_1$) in which both the consonants and vowels are the same. They may be varied so that either the consonant or vowel or both are different ($C_1V_1C_2V_2$ or $C_1V_1C_1V_2$ or $C_1V_1C_2V_1$).

j) A word is defined as a sound or series of sounds which carry definite meaning for the child and his parents or other listeners. The labeling of a consonant-vowel utterance as a word implies that the child is using the sounds consistently in an attempt at meaningful communication.

k) Word combinations, phrases, and early 2-3 word sentences are defined as the meaningful combining of two or more words in a manner which carries meaning to the child and the listener. It does not include the simple naming of several single items, each of which might serve as a single word "sentence" to the child. Although pauses may occur between the two words, they are related in a manner characteristic of early sentence development.

## V. RESPIRATION-PHONATION

### Common Testing Procedures

The following testing procedure applies to all of the categories in the Respiratory-Phonatory section. For purposes of conservation of space and increased clarity they will be provided for the examiner only at the beginning of this section.

The child should be observed throughout the evaluation session(s). If there seem to be any difficulties producing voice, the child should be placed in the physical position where postural tone is most normal and phonation is the easiest. Specific preparation of the child through movement, inhibition of shoulder girdle hypertonicity, use of vibration or other inhibitory or facilitatory techniques should not be done. Written instructions for making the recording should be given to the parent or teacher (See Appendix H).

If phonation does not occur or is limited during evaluation of treatment sessions, a tape recording of the child's vocalization at home or school may be used. Parental reports may be included in the narrative portion of the evaluation, but should not be used for scoring.

If the child is producing words and sentences, she should be given a simple naming task with a specified group of animal words and simple phrases at the meaningful speech level. This should be supplemented with the elicitation of animal sounds and environmental noises at the non-speech level. Where possible spontaneous utterances should be elicited rather than imitated responses. This will assist in determining the influence of meaningfulness and structural complexity on the child's successful performance. Specific materials and instructions for their use are provided in Appendix I. This specifically elicited vocalization may be supplemented by other vocalizations or words which may occur spontaneously. The child's phonatory patterns should be tape recorded for later scoring.

## V. RESPIRATION-PHONATION

### Common Scoring Information

The following scoring information applies to all of the categories in the Respiratory-Phonatory Section. For purposes of conservation of space and increased clarity they will be provided for the examiner only at the beginning of this section.

a) If the child does not produce crying vocalization during the evaluation or on other taped phonation samples, the examiner must score the child solely on the non-crying phonation which is produced. If the child produces some non-crying phonation which meets the normal criteria for the category being scored, one may presume that the cry also has normal aspects or that abnormalities which occur are not severe enough to give the child a -9 score. If the child shows difficulty with phonation of vowels or single consonant-vowel syllables, the examiner may not automatically assume that cry vocalization would be normal. Because crying has not occurred, the child must be given the benefit of the doubt and scored for the behaviors which have actually occurred (i.e., scores of -5 to -8). If crying is heard at a later date, the abnormal score may be revised downward if a substantial degree of abnormality occurs. If no crying is heard and the child does not produce vowels or consonant-vowel syllables at the normal level, a normal score may not be presumed or given for crying. If the child satisfies the criterion for 75% normal behavior in a non-crying area, a normal score may be given even though crying has not been heard.

b) Questions in scoring may arise when the child has reached a stage of linguistic production in which his or her only utterances are words and early sentences. Attempts should be made to obtain non-meaningful phonation from the child (i.e., animal sounds, environmental noises, babble-like code games). If an adequate amount of non-meaningful phonation at different levels of structural complexity cannot be elicited, the examiner faces a dilemma for scoring and interpretation of the results and their implications as a pre-speech predictor. The stage of development in which two or more consonant-vowel combinations are sequenced in a timing framework has been thought to provide the timing structure for later speech syllable development and the sustained flow of speech. How does one score or deal with the child who has reached a word level of production utilizing solely a single vowel or single consonant-vowel syllable? At one level, the child has successfully carried over or attempted to use the feature (of duration, loudness, voice quality) at a meaningful level. On the other hand, an aspect of structural complexity occurring at a lower level has been omitted or not experienced. It is not known how seriously this will affect full speech production skill at a later point in development.

For scoring the child who does not meet the structural complexity criterion for words at the 15 month level (i.e., producing words with a CV, CVC, or CVCV structure), the following rationale and procedures for scoring will be used:

1. The pre-speech capability being measured is an aspect of respiratory-phonatory control. If the child's failure to produce words or phrases with adequate structural content is related to an aspect of phonation, this should be taken into consideration in scoring an aspect of respiratory-phonatory development. If the failure to produce words or phrases with adequate structural content is related to a limitation in articulatory control, this should not penalize the child in his scores in the respiratory-phonatory category.

2. The respiratory-phonatory feature most likely to affect the child's ability to use sequenced articulatory movements is that of duration of phonation. Therefore, if the child does not produce CV or CVCV utterances and has a duration of under 1-2 seconds, one may presume that the pre-speech component of respiration-phonation will influence her later speech development. In most instances poor duration also affects the child's performance in features of loudness, intonation, initiation and voice quality as well.

3. If there is inadequate duration of phonation to support single words (i.e., sustained for 1-2 seconds) and the child does not produce words containing consonants (i.e., words consist of only vowels and dipthongs) he or she would not be allowed to receive a normal score as high as the word level even if the words produced were of normal loudness, intonation, voice quality, etc. The normal score (if there were one) would lie between 3 and 6 months. In a similar manner, the score in the abnormal area would also be based on presence or absence of abnormality at the level of vowel production.

4. If the duration of phonation is adequate at the word level (i.e., sustained for 1-2 seconds or until the end of the word), one may presume that phonation is adequate to support consonant production. The lack of consonant production in this case is probably related to a problem of sound production or articulation. Since this does not represent a primary respiratory-phonatory deficit, the child would receive credit for any normal behaviors which occurred at the word level. In this case a score of 15 months could be given, despite the lack of consonant production. Abnormal scores might also be given at the word level.

5. If the child had a totally normal respiratory-phonatory system, one could presume that duration of phonation would be increased automatically to compensate for slow or difficult articulatory movements. For this reason, if the child is given a normal score between 15 and 24 months without the presence of CV syllables, an abnormal score of -1 should be given also in the category of duration or phonation.

Common Scoring Information (continued)

c) If the child continues to produce only words and no non-meaningful utterances are produced, scoring should be based on the speech utterances. In most instances this will mean giving an abnormal score in the -4 to -2 range. No score will be given in the normal area unless the child meets the 75% competency level for words.

d) The child must satisfy all criteria listed at the + 24 month level to receive this score. If articulatory skill interfered with the ability to produce CVCV syllables in words, this should be noted in the narrative, but the child could not receive full credit in the respiratory-phonatory category.

#17. INITIATION OF PHONATION

Testing Procedure:

The basic testing procedure for evaluating respiration-phonation (see page 103) should be followed.

Specific Scoring Information

a) A laryngeal bloc is defined as the momentary inability to produce sound due to poor coordination of closure of the vocal folds with the column of air moving upward in the trachea. Both open and closed laryngel blocs can occur.

b) A closed laryngeal bloc is defined as vocal fold closure which is too firm or occurs strongly without adequate air flow. This is characterized auditorially by a lack of any sound from voicing or air movement. The bloc is often released suddenly with a sharp, hard onset of voicing. The child may physically struggle to get the sound out.

c) An open laryngeal bloc is defined as a delay in vocal fold closure causing the folds to remain in the open position as the air flow is released. A sound of rushing air with no voice is heard. This may be followed by some voicing as the child intermittently is able to coordinate the timing of vocal fold vibration with air flow from the lungs.

d) A hard glottal attack is defined as a firm or sudden approximation of the vocal folds at the initiation of a syllable or a word. It does not have the characteristic of poor timing of vocal fold vibration with the air stream, but seems more related to poor regulation of the the force of laryngeal vibration. Hard glottal attacks are heard in the vocalization of normally developing children well past the pre-speech development period. For purposes of this scale,they would be considered mildly abnormal (score of -1) only when accompanied by head extension or a jaw thrust.

e) The easy initiation of phonation implies that the timing of the air stream and vocal fold closure is adequate to produce voice which begins gradually and without any tendency toward laryngeal blocs.

f) A voiced consonant is defined as a consonantal sound produced with voicing or vibration of the vocal folds. (i.e., /b/,/m/,/d/,/g/,/v/,/z/,/zh/,/j/).

g) A voiceless consonant is defined as a consonantal sound produced without voicing or a lack of vibration of the vocal folds (i.e., /p/,/t/,/k/,/f/,/s/,/sh/,/ch/). In order to produce voiceless consonant syllables the child must move from a lack of voicing for the consonant into a voiced vowel.

h) Voiced-voiceless contrasts implies that both the place and manner of articulation for two consonants is the same. The contrast in production lies solely in the presence or absence of voicing (i.e., /b/-/p/; /d/-/t/; /v/-/f/;/g/-/k/; /z/-/s/).

i) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of the initiation of phonation which should be scored as a -1 would include: phonation in a hypotonic child which begins with difficulty but is within normal ranges once the child has built up postural tone through physical activity or continued phonation; hard glottal attacks which occur in conjunction with head extension or jaw thrusting.

j) Guidelines for the Use of the Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the frequency or severity of interference with phonation by abnormal patterns, the frequency and variety of normal phonation and voiced-voiceless contrasts, the occurrence of more advanced emerging behaviors.

#17. INITIATION OF PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough phonation to evaluate function. The lack of voicing is due to severe problems of neuromuscular coordination. Both crying and non-crying phonation occur with extremely low frequency.<br>OR<br>b) Child experiences difficulty in initiating voicing during crying. This may be seen in the presence of open or closed laryngeal blocs during crying or frequent crying without any voicing. |
| -8 | Child experiences difficulties in initiating voicing during crying, less than 25% of the time. Difficulties in initiating voicing occur more than 75% of the time in vowels or consonant-vowel syllables (CV). The child experiences open or closed laryngeal blocs which make it difficult for her to initiate voicing or may cut off voicing suddenly. |
| -6 | Difficulties in initiating voicing occur less than 75% of the time in vowels, consonant-vowel syllables (CV), or consonant-vowel combinations (CVCV). The child experiences open or closed laryngeal blocs which make it difficult for her to initiate voicing or may cut off voicing suddenly. |
| -4 | Child does not experience difficulties in initiating voicing during non-speech phonation. Difficulty in initiating voicing occurs more than 75% of the time in single words. Open or closed laryngeal blocs make it difficult for her to initiate voicing or may cut it off suddenly. |
| -2 | Child does not experience difficulties in initiating voicing during non-speech phonation or during single words. Difficulty in initiating voicing with the presence of open or closed laryngeal blocs occurs in 2 and 3 word combinations. |
| -1 | The initiation of phonation shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough phonation to evaluate function. This is due to prematurity, retardation, emotional disturbance, deafness or other medical or behavioral reasons not related to a primary respiratory-phonatory disorder. |
| 1 month | Child cries, laughs or squeals with easy initiation of phonation. |
| 3 months | Child produces vowels with easy initiation of phonation. |
| 6 months | Child produces single consonant-vowel syllables (CV) with easy initiation of phonation. Either voiced or voiceless consonants are produced within a syllable. |
| 9 months | Child produces a series of consonant and vowel combinations (CVCV) with easy initiation of phonation. Both voiced and voiceless consonants can be produced in single consonant-vowel syllables (CV). Consonants may be voiced-voiceless contrasts produced with the same place of articulation. |
| 15 months | Child produces single words spontaneously or in imitation with easy initiation of phonation. Consonants are included in words with either a consonant-vowel (CV) or consonant-vowel series (CVCV) structure. |
| +24 months | Child combines two or more words in simple phrases or sentences with easy initiation of phonation. Words include both voiced and voiceless consonants in the initial or medial syllables within the word or phrase. Both CV and CVCV word structures are present. |

## #18. DURATION OF PHONATION

Testing Procedure:

The basic testing procedure for evaluating respiration-phonation (see page 103) should be followed. Duration may be timed directly with a stop watch or second hand. One may also imitate the duration of the child's voice and then time one's own production. The longest duration produced two or more times should be used for scoring.

Specific Scoring Information

a) The duration of phonation is defined as the length of time which a child can sustain the voice on a single breath during crying or non-crying phonation. Since the duration of fussing or distress vocalization is shorter than that of full crying, distress phonation should not be counted within the crying category.

b) Abnormal patterns of tone and movement are defined as increased or marked fluctuations in muscle or postural tone which usually occur in stereotyped or reflex patterns. These include patterns of flexion, extension or asymmetry throughout the involved portions of the body. They would also include specific abnormal responses in the face such as a jaw thrust, tongue thrust, lip or tongue retraction, which would occur in accompaniment to phonation. These are often seen as associated reactions in which the effort to produce or sustain phonation triggers abnormal patterns of tone and movement in other areas of the body. Increased tension during early phonatory and speech production will further reduce the child's control of the duration of voicing.

c) The examiner must perceptually differentiate the loss of volume or breath support during crying or non-crying phonation from the normal lowering of pitch occurring in the normal infant. Often a breathy ending can be heard as the volume is lost and the child is unable to sustain phonation.

d) If the child receives an abnormal score only on the basis of tension or associated reactions, he should also receive a normal developmental score for appropriate duration. Scoring of an appropriate duration in the normal area does not require that normal postural tone be present. For example, a child who produces a duration of 1-2 seconds for sequenced consonant-vowel combinations with strong shoulder-girdle tension would receive both a -6b and 9 months.

e) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of the duration of phonation which could be scored as a -1 would include: Phonation in a hypotonic child which is initially short, but is within normal ranges once the child has built up postural tone through physical activity or continued phonation; extreme variability in duration or postural tone; the use of laryngeal tension to control duration; problems with duration related to chronic colds and laryngitis; failure to produce words with a CV or CVCV structure when there is adequate duration for words with a V structure (see p.104, b)5.).

f) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the frequency or severity of hypertonicity and associated reactions during phonation; the frequency and variety of phonation of normal duration; the occurrence of more advanced emerging patterns.

#18. DURATION OF PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough phonation to evaluate function. The lack of voicing is due to severe problems of neuromuscular coordination. Both crying and non-crying phonation occur with extremely low frequency.<br>OR<br>b) Duration of the child's crying is in short bursts of less than 1 second. Although these shorter sequences may occur normally within the hunger cry, the child shows few longer bursts. This occurs more than 75% of the time.<br>OR<br>c) Duration of the child's cry is 1 second or more but it dies down in volume or phonation ceases with continued air flow at the end of each crying burst. |
| -8 | a) Child's cry shows duration of 1 second or more. Longest vowel duration is 1/2 second or less.<br>OR<br>b) Child is consistently stiff or shows strong associated reactions involving abnormal patterns of tone and movement more than 75% of the time when producing vowels. |
| -6 | a) Child shows duration of greater than 1/2 second for vowels. Abnormal increases in bodily tension occurs less than 75% of the time. Duration of consonant-vowel combinations (CVCV) is less than 1 second.<br>OR<br>b) Child is consistently stiff or shows strong associated reactions more than 75% of the time when producing consonant-vowel combinations. |
| -4 | Child has difficulty obtaining adequate duration of phonation to support single words of 1-2 syllables in length without tension. Phonation may die out at the end, or may be accompanied by increases in tension or associated reactions involving abnormal patterns of tone and movement. |
| -2 | Child has difficulty obtaining adequate duration of phonation to support 2 and 3 word combinations without tension. Phonation may die out at the end, air wastage may occur, or phonation may be forced and accompanied by increases in tension or associated reactions involving abnormal patterns of tone and movement. |
| -1 | The duration of phonation shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough phonation to evaluate function. This is due to prematurity, retardation, emotional disturbance, deafness or other medical or behavioral reasons not related to a primary respiratory-phonatory disorder. |
| 1 month | Duration of crying is 1 second or more and does not die down in volume at the end of each burst. |
| 3 months | Duration of vowels is 1 second or more. |
| 6 months | Duration of single consonant-vowel syllables (CV) is 1/2 second or more. |
| 9 months | Duration of consonant-vowel combinations (CVCV) is 1 second or more. |
| 15 months | Duration of phonation in single words with a (CV) or (CVCV) structure is 1-2 seconds. Phonation is sustained appropriately until the end of the word. |
| +24 months | Duration of phonation for 2-3 word phrases or sentences is at least 1-2 seconds. Duration is sustained appropriately until the end of the utterance. Child may show tension, poorly sustained phonation or other difficulties of duration for utterances longer than three words. Both CV and CVCV word structures are present. |

#19. LOUDNESS OF PHONATION

Testing Procedure

The basic testing procedure for evaluating respiration-phonation (see page 103) should be followed. Both the adequacy of the child's basic loudness level and the variability in loudness levels should be observed. Increases in loudness should be observed in relationship to increases in body tension. If loudness increases do not occur spontaneously in a shy or quiet child, games may be devised to see if the voice becomes louder when calling someone outside the room or becomes softer when talking very quietly so as not to wake up an animal or doll.

Specific Scoring Information

a) A voice which is weak, quiet, low in volume or difficult to hear is one which lacks force behind it and may cause the listener to strain to hear the child. The weak, quiet voice is often accompanied by hypotonicity or floppiness in the child or by poor or absent contraction of the abdominal muscles during sustained phonation. It may also be abnormal in loudness due to hypertonicity and overall tension in the abdominal and/or laryngeal areas. Both situations make the control of sub-glottal air pressure and vocal fold action inefficient.

b) Abnormal patterns of tone and movement are defined as increases or marked fluctuations in muscle or postural tone which usually occur in stereotyped or reflex patterns. These include patterns of flexion, extension, or asymmetry throughout the involved portions of the body. They would also include specific abnormal responses in the face such as a jaw thrust, tongue thrust, lip or tongue retraction, which would occur as the child tries to vocalize. These are often seen as associated reactions in which the effort to produce louder phonation triggers abnormal patterns of tone and movement in other areas of the body. Increased tension during early phonation and speech production will further reduce the child's control of loudness of voicing.

c) Appropriate loudness is defined as a perceptual level which is comfortable to the listener and appears to be appropriate for the child's age. This is a very subjective judgment. The major concern in this Scale concerns abnormal variations of loudness in which it is difficult for the child to obtain enough volume to be heard comfortably, or where the attainment of volume is accompanied by effort and abnormal patterns of tone and movement. Abnormal variations in volume in which the child is consistently loud may be related to variations in normal pre-school speech, behavioral or attention-getting problems or to hearing loss. These variations are not covered in the Scale.

d) Adequate variability is defined as the ability of the child to show quiet, normal conversational and loud volume of the voice. This should be appropriate to the situation, and changes in loudness level should occur gradually and without suddenness, unless the sudden change is appropriate to the situation.

e) The examiner must differentiate the normal accompaniment of associated movements in the young child who may be asked to shout or call very loudly from the associated reactions of the abnormal child. In the normal child the extraneous movements or overflow are not accompanied by strong tension as they are in the definition of "associated reactions with abnormal patterns of tone and movement."

f) The examiner must differentiate between abnormal patterns of tone and movement which occur because of the increased effort involved in becoming louder from increased effort related to problems with duration or articulatory production. If the child shows abnormal tone during an utterance, the examiner should try to obtain a repetition of the utterance at a lower loudness level. If abnormal tone and reactions continue to occur as loudness is reduced, the examiner should simplify other aspects of production such as duration and articulatory complexity. This must be individualized for each child. For example, if the child produces the word, "mama" with tension, the examiner might elicit single syllable words such as "bye" or "no" which require a shorter duration and less articulatory skill. The utterance could be simplified still further by use of words with a vowel structure such as "eye" or "ear". If the examiner feels that the increases in tension are not related to the parameter of loudness, an abnormal score for tension increases only should not be given.

g) If the child receives an abnormal score only on the basis of tension or associated reactions, a normal score for appropriate loudness should also be given. Scoring of an appropriate loudness in the normal area does not require that normal postural tone be present.

h) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of the loudness of phonation which could be scored as a -1 would include: phonation in a hypotonic child which is initially weak or quiet but is within normal limits for loudness once the child has built up postural tone through physical activity or continued phonation; extreme variability in loudness or postural tone; the use of laryngeal tension to control loudness; problems with loudness related to chronic colds and laryngitis; phonation which is consistently too loud; inability to use the loudness feature appropriately for stress.

i) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the frequency or severity of hypertonicity and associated reactions during phonation; the frequency and variety of phonation of normal loudness; the occurrence of more advanced emerging patterns.

#19. LOUDNESS OF PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough phonation to evaluate function. The lack of voicing is due to severe problems of neuromuscular coordination. Both crying and non-crying phonation occur with extremely low frequency.<br>OR<br>b) Child's cry is weak, quiet, low in volume or difficult to hear. Loud crying is rarely or never heard. The baby may be very floppy or may never use body stiffening to indicate upset or anger with his crying.<br>OR<br>c) Child's cry is generally weak, low in volume or very difficult to hear. However, it becomes loud or louder as the child develops more postural tone. This change in volume occurs with at least 75% of the child's crying. |
| -8 | a) Child's cry shows appropriate loudness. Vowels are low in volume, quiet, weak, or difficult to hear more than 75% of the time. Phonation may become louder as the child develops more postural tone.<br>OR<br>b) Child is consistently stiff or shows associated reactions involving abnormal patterns of tone and movement when vowels are loud or become louder. This increase in abnormal tone occurs with at least 75% of the child's vowel production. |
| -6 | a) Vowels show appropriate variations in loudness and are accompanied by abnormal increases in bodily tension less than 75% of the time. Consonant-vowel combinations (CVCV) are low in volume, quiet, weak or difficult to hear. Phonation may become louder as the child develops more postural tone.<br>OR<br>b) Child is consistently stiff or shows associated reactions involving abnormal patterns of tone and movement when consonant-vowel combinations are loud or become louder. This increase in abnormal tone occurs with at least 75% of the child's consonant-vowel (CV or CVCV) combinations. |
| -4 | Child shows inappropriate loudness or tension with loudness for single words more than 75% of the time. Volume is typically low or the child shows increased postural tone and associated reactions as loudness increases. |
| -2 | Child shows inappropriate loudness or tension with loudness for 2-3 word phrases or sentences more than 75% of the time. Volume is typically low or the child shows increased postural tone and associated reactions as loudness increases. Speech volume may be adequate at the beginning of the phrase and die out at the end. |
| -1 | The loudness of phonation shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough phonation to evaluate function. This is due to prematurity, retardation, emotional disturbance, deafness or other medical or behavioral reasons not related to a primary respiratory-phonatory disorder. |
| 1 month | Child's cry shows appropriate loudness and the ability to vary loudness levels. |
| 3 months | Vowels show appropriate loudness and the ability to vary loudness levels. |
| 6 months | Single consonant-vowel syllables (CV) show appropriate loudness and the ability to vary loudness levels. |
| 9 months | Sequenced consonant-vowel combinations (CVCV) show appropriate loudness and the ability to vary loudness levels. |
| 15 months | Single words with a (CV) or (CVCV) structure are produced with appropriate loudness and the ability to vary loudness levels. |
| + 24 months | 2 to 3 word phrases or sentences are produced with appropriate loudness and the ability to vary loudness levels. The child may show some tension or poorly modulated loudness levels with utterances longer than three words. Both CV or CVCV word structures are present. |

## #20. PITCH AND INTONATION PATTERNS IN PHONATION

### Testing Procedure

The basic testing procedure for evaluating respiration-phonation (see page 103) should be followed. If appropriate pitch variations do not occur spontaneously, the examiner should attempt to get some imitative intonation patterns through play with a toy fire engine, imitation of animals such as rooster, cat or donkey, or other game-like situation in which the child is provided with exaggerated intonation patterns as models.

### Specific Scoring Information

a) An abnormally high or low pitch level is defined as a voice whose pitch level is high or low enough to cause the listener to perceive it as unusual or abnormal for a young child. A high-pitched voice in crying is often an early sign of brain damage and may have either a thin or tense quality to it as well. Increased laryngeal tension can also raise the pitch of the voice.

b) Inappropriate breaks in the pitch level of the voice is defined as the relatively abrupt change in pitch which may occur in a child experiencing poor or variable control of the vocal folds and sub-glottal air pressure. The child may be speaking at one pitch level and then produce a word or phrase at a pitch level which is abnormally high or low. These types of pitch break are frequently seen in adolescent boys who are going through a "change of voice." This must be taken into consideration in scoring if the child is a boy in the early adolescent age period. Parents should be asked whether his voice made these types of changes when he was younger.

c) A melody pattern is defined as smooth changes in the pitch of the voice. The term is usually used with an adjective which describes the direction or directions of the pitch change. (i.e., flat, rising-falling, falling-rising).

d) Intonation contours are defined as melody patterns or smooth changes in pitch which carry meaning, emphasis or other information. The voice without adequate pitch changes in intonation contours is described as monotonous. The use of intonation contours in words, phrases, and sentences is referred to as the intonation pattern.

e) Limited intonation contours is defined as the reduction in variability in intonation which the child has available to him in sound play, words, or early sentence production. The range of pitch change is more limited and the child's voice has a more monotonous character to it.

f) Appropriateness of intonation contours is defined as the child's ability to control the smooth changes in pitch and apply them according to the rules of the language for expressing meaning through changes in intonation. For example, a rising intonation at the end of a word or phrase usually indicates a question while a falling or downward intonation contour signifies a statement.

g) A child with an inappropriate fundamental pitch level and appropriate intonation contours may be scored in the normal development area for intonation and in the abnormal area for pitch level.

h) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of pitch and intonation patterns which could be scored as a -1 could include: extreme variability in pitch or intonation patterns; pitch patterns in non-speech phonation which are very high or very low less than 75% of the time.

i) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the frequency and variety of intonation or pitch patterns; the amount of variability in type and frequency of sound play; the occurrence of more advanced emerging patterns.

#20. PITCH AND INTONATION PATTERNS IN PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough phonation to evaluate function. The lack of voicing is due to severe problems of neuromuscular coordination. Both crying and non-crying phonation occur with extremely low frequency.<br>OR<br>b) Crying is abnormally high or low pitched more than 75% of the time.<br>OR<br>c) A flat melody pattern or a falling-rising pattern predominates during crying. Falling or rising-falling intonation contours are absent or occur infrequently. |
| -8 | a) Vowels are abnormally high or low pitched more than 75% of the time. An appropriate pitch occurs more than 25% of the time during crying.<br>OR<br>b) A flat melody pattern with no rising or falling intonation contours occurs more than 75% of the time during production of vowels. Cry patterns contain rising-falling or falling intonation contours more than 25% of the time. |
| -6 | a) Single consonant-vowel syllables (CV) or consonant-vowel combinations (CVCV) are abnormally high or low pitched more than 75% of the time. An appropriate pitch level occurs more than 25% of the time for vowels.<br>OR<br>b) A flat melody pattern with no rising or falling intonation contours occurs more than 75% of the time during production of single consonant-vowel syllables (CV) or sequenced consonant-vowel combinations (CVCV). Intonation contours occur more than 25% of the time during vowels. |
| -4 | Pitch and intonation patterns in single words are limited or inappropriate. The following may be heard:<br>a) Regulation of the pitch level is limited or inappropriate. Pitch may be abnormally high or low. Marked changes or inappropriate pitch breaks may occur.<br>OR<br>b) No intonation patterns occur. Child consistently uses a flat melody pattern.<br>OR<br>c) Intonation patterns occur but are limited or used inappropriately or in a manner which the listener perceives as abnormal. |
| -2 | Pitch and intonation patterns in 2-3 word phrases or sentences are limited or inappropriate. The following may be heard:<br>a) Regulation of the pitch level is limited or inappropriate. Pitch may be abnormally high or low. Marked changes or inappropriate pitch breaks may occur.<br>OR<br>b) No intonation patterns occur. Child consistently uses a flat melody pattern.<br>OR<br>c) Intonation patterns occur but are limited or used inappropriately or in a manner which the listener perceives as abnormal. |
| -1 | Pitch and intonation patterns show mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough phonation to evaluate function. This is due to prematurity, retardation, emotional disturbance, deafness or other medical or behavioral reasons not related to a primary respiratory-phonatory disorder. |
| 1 month | Rising-falling or falling melody patterns predominate during crying. |
| 3 months | Rising-falling melody patterns occur at least 25% of the time during production of vowels. |
| 6 months | Rising or falling melody patterns occur at least 25% of the time during production of single consonant-vowel syllables (CV). |
| 9 months | Rising or falling melody patterns occur at least 25% of the time during production of sequenced consonant-vowel combinations (CVCV). May play with pitch changes in squealing and growling. |
| 15 months | Appropriate and varied pitch and intonation patterns occur in single words with a (CV) or (CVCV) structure. Child can produce intonation variations for declaratives and questions. |
| + 24 months | Pitch and intonation patterns occur for 2-3 word phrases or sentences. These are varied and used appropriately by the child. Both CV and CVCV word structures are present. |

#21. VOICE QUALITY DURING NON-SPEECH PHONATION

Testing Procedure

The basic testing procedure for evaluating respiration-phonation (see page 103) should be followed.

Specific Scoring Procedures

a) Voice quality describes the auditory aspects of function of the vocal folds. Adequate closure, efficient timing of closure and the amount of tonicity within the folds themselves will influence the type of voice produced. A normal vocal quality is described as non-tense, lacking in extraneous noise, non-breathy, and easily produced and sustained throughout phonation.

b) Non-speech phonation is defined as any vocalization which the child produces which would not be considered a word, phrase, or sentence. This would include crying, distress, laughing, squealing, pleasurable vocalizations without the clear-cut quality of a vowel or consonant, vowels, single consonant-vowel syllables, or sequenced consonant vowel combinations.

c) Tense vocal quality is defined as a perception of tightness or tension in the voice. The voice often has a high-pitched quality to it.

d) Hoarse vocal quality sounds as though the child has laryngitis. It is strained and tightly breathy.

e) Breathy vocal quality is voicing in which vocal fold approximation is weak or poorly timed so that too much air is released during phonation. The listener hears a weak voice with audible air release during phonation. Phonation sounds as if the speaker were half whispering.

f) Strangled vocal quality is defined as a perception of tightness with added breathiness and short sequence bursts of phonation. There may be a slightly nasal quality due to partial occlusion of the airway by the dorsum of the tongue.

g) Some children appear to be using many words and phrases which are not always consistent or clear to the listener. This is particularly true among athetoid cerebral palsied children whose speech patterns vary a great deal with their fluctuations in postural tone. If the listener and/or parent feels that all vocalization which the child uses is an attempt to meaningful words or sentences, the child should be scored at 15. If the listener and/or parent feels that some of the child's vocalizations serve as "fillers" or vocal bridges between her understandable words, they should be classified as non-speech vocalizations. Where these fillers make up 75% or more of the child's vocal putput, a score of below 15 months would be given. The child could also be scored for Voice Quality During Early Speech Phonation since meaningful speech also occurs.

h) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of voice quality during non-speech production which could be scored as a -1 would include: unusual variations in the distribution of voice quality problems in the sound play; phonation in a hypotonic child which is initially breathy or hoarse but is within normal limits once the child has built up postural tone through physical activity or continued phonation; problems with vocal quality related to chronic colds and laryngitis.

i) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the amount of variability in type and frequency of sound play with normal vocal quality; the occurrence of more advanced emerging patterns.

#21. VOICE QUALITY DURING NON-SPEECH PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough phonation to evaluate function. The lack of voicing is due to severe problems of neuromuscular coordination. Both crying and non-crying phonation occur with extremely low frequency.<br>OR<br>b) Crying is tense, hoarse, breathy, or strangled 100% of the time. |
| -8 | Cry patterns show the variations described at 1 month. Laughter, squealing, or vowel production is tense, hoarse, breathy, or strangled more than 75% of the time. |
| -7 | Laughter, squealing, or vowel production is tense, hoarse, breathy, or strangled between 25% and 75% of the time. |
| -5 | Single consonant-vowel syllables (CV) are tense, hoarse, breathy, or strangled more than 75% of the time. |
| -4 | Sequenced consonant-vowel combinations (CVCV) are tense, hoarse, breathy, or strangled more than 75% of the time. |
| -3 | Sequenced consonant-vowel combinations (CVCV) are tense, hoarse, breathy, or strangled between 25% and 75% of the time. |
| -1 | Voice quality during non-speech phonation shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough phonation to evaluate function. This is due to prematurity, retardation, emotional disturbance, deafness, or other medical or behavioral reasons not related to a primary respiratory-phonatory disorder. |
| 1 month | Crying may be tense, harsh or breathy when the child is hungry, but this pattern alternates with non-breathy phonation during anger or pain cries, and with more relaxed sounds of pleasure. |
| 3 months | Emotional phonation shows variability in quality depending upon whether the child is hungry, angry, or showing pleasure. Vowel production occurs at least 25% of the time with no problems of voice quality. |
| 6 months | Single consonant-vowel syllables (CV) occur at least 25% of the time with no problems of voice quality. |
| 9 months | Sequenced consonant-vowel combinations (CVCV) occur at least 25% of the time with no problems of voice quality. |
| 15 months | Child is producing words, phrases, or sentences. Problems with voice quality may be present for speech. Non-speech phonation may no longer be heard or considered developmentally appropriate. If non-speech phonation occurs spontaneously or elicited in a game, problems with voice quality are not present. |

## #22. VOICE QUALITY DURING EARLY SPEECH PHONATION

### Testing Procedure

The basic testing procedure for evaluating respiration-phonation (see page 103) should be followed. The examiner should attempt to discover whether vocal quality is different for utterances containing voiceless consonants and voiced consonants. The production of these two types of consonants requires different valving in the larynx and different timing and movement into the voiced vowel which follows.

### Specific Scoring Procedures

a) Voice quality describes the auditory aspects of function of the vocal folds. Adequate closure, efficient timing of closure and the amount of tonicity within the folds themselves will influence the type of voice produced. A normal vocal quality is described as non-tense, lacking in extraneous noise, non-breathy, and easily produced and sustained throughout phonation.

b) Early speech phonation is defined as any vocalization which the child produces which would be considered a word or simple phrase.

c) Tense vocal quality is defined as a perception of tightness or tension in the voice. The voice often has a high-pitched and brassy quality to it.

d) Hoarse vocal quality sounds as though the child had laryngitis. It is strained and tightly breathy.

e) Breathy vocal quality is voicing in which vocal fold approximation is weak or poorly timed so that too much air is released during phonation. The listener hears a weak voice with audible air release during phonation. Phonation sounds as if the speaker were half whispering.

f) Strangled vocal quality is defined as a perception of tightness with added breathiness and short sequence bursts of phonation. There may be a slight nasal quality to it due to partial occlusion of the airway by the dorsum of the tongue.

g) A voiced consonant is defined as a consonantal sound produced with voicing or vibration of the vocal folds (i.e., /b/, /m/, /d/, /g/, /v/, /z/, /zh/, /j/).

h) A voiceless consonant is defined as a consonantal sound produced without voicing or a lack of vibration of the vocal folds (i.e., /p/, /t/, /k/, /f/, /s/, /sh/, /ch/). In order to produce voiceless consonant syllables, the child must move from a lack of voicing for the consonant into a voiced vowel.

i) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of voice quality during early speech phonation which could be scored as a -1 would include: unusual variations in the distribution of voice quality problems in speech; phonation in a hypotonic child which is initially breathy or hoarse but is within normal limits once the child has built up postural tone through physical activity or continued phonation; problems with vocal quality related to chronic colds and laryngitis.

j) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the amount of variability and frequency of voice quality problems; the frequency of word and early sentence production; the occurrence of more advanced emerging patterns.

#22. VOICE QUALITY DURING EARLY SPEECH PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | Child is unable to produce enough phonation to evaluate function. The lack of voicing is due to severe problems of neuromuscular coordination. Early speech phonation occurs with extremely low frequency. |
| -8 | Voice quality in the production of single words containing voiced consonants and/or vowels is tense, hoarse, breathy, or strangled more than 75% of the time. |
| -7 | a) Voice quality in the production of single words containing voiced consonants and/or vowels is tense, hoarse, breathy, or strangled between 25% and 75% of the time. The child may not produce voiceless consonants.<br>OR<br>b) Voice quality in the production of single words with voiced consonants and/or vowels is normal at least 25% of the time. Words containing voiceless consonants and vowels are tense, hoarse, breathy, or strangled more than 75% of the time. |
| -4 | Voice quality in the production of 2-3 word combinations and sentences is tense, hoarse, breathy, or strangled more than 75% of the time. |
| -3 | Voice quality in the production of 2-3 word combinations and sentences is tense, hoarse, breathy, or strangled between 25% and 75% of the time. |
| -1 | Voice quality during early speech phonation shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| 0 or X | The child does not produce enough words to evaluate function. This is due to chronological age, retardation, emotional disturbance, deafness, severe impairment of the speech articulators, or other medical or behavioral reasons not related to a primary respiratory-phonatory disorder. |
| 12 months | Single words containing vowels only are produced at least 25% of the time with no problems of voice quality. |
| 15 months | Single words containing vowels only are produced at least 75% of the time with no problems of voice quality. Single words containing voiced consonants are produced at least 25% of the time with no problems of voice quality. |
| 18 months | Single words containing voiced consonants are produced at least 75% of the time with no problems of voice quality. Single words containing voiceless consonants are produced at least 25% of the time with no problems of voice quality. Both CV and CVCV word structures are present. |
| 24 months | Normal voice quality is heard in the production of single words containing voiced and voiceless consonants. If the child is producing 2-word phrases, normal vocal quality occurs at least 25% of the time. |
| + 24 months | Normal voice quality is heard in the production of 2-3 word phrases and sentences at least 75% of the time. Abnormal vocal qualities may still occur in longer sentences. |

## AN APPROACH TO THE EVALUATION OF SOUND PLAY BEHAVIORS

### Basic Concepts

As the normal infant develops control of movement within the oral tract, the ability to valve a long tube (i.e., the vocal tract) or change its configuration increases. This produces a wider variety of sounds when the child vocalizes. Variations in tongue position, cavity size and configuration contribute to our perception of different vowels. Variations in constrictions or closure of the tube result in production of sounds which are described as consonants.

The Pre-Speech Assessment Scale attempts to measure the type and variety of sounds produced as the oral mechanism increases its ability to change shape and points of constriction or contact.

The development of movement control of the articulators (jaw, tongue, lips, and velopharynx) and their coordination with phonation, appears to vary in the cerebral palsied child with two aspects of complexity. As the system must deal with more complex demands for sequencing or speed and with the added rules and restraints of linguistic features, breakdowns occur in sound production. As the physical complexity is increased by going from single consonant-vowel syllables (CV) to sequenced consonant-vowel combinations (CVCV), control of pressure or speed of lip or tongue movement may decrease. The child who has adequate duration of phonation for extended vowels and is able to produce the single syllable /ma/ may be unable to produce sequential lip closure to produce /mamama/. She may be able to sequence two or more syllables if they are produced in an identical manner (i.e., /ma-ma-ma/), yet be unable to produce two or more syllables if they are different in place or manner of production (i.e., ma-da-go).

The addition of meaningfulness or communicative intent may also reduce the variability or efficiency of the sound production system. A child who freely babbled strings of consonant-vowel combinations or produced fricatives at a meaningless level of sound play may not be able to produce the same combinations or phonemes when they are attempted as part of a word. The more automatic the production, the more likely it is to be produced with a wider variety of sounds, or more appropriately sequenced syllables.

The Pre-Speech Assessment Scale is built upon the premise that increases in structural complexity and meaningfulness may affect the child's skill in the use of sound production. This hypothesis has never been formally tested in normal children. Since normal children would be limited by less severe movement control difficulties than cerebral palsied children, its influence is not as obvious.

In attempting to transcribe the sounds and sequences produced by the child, the examiner should remember that structural differences in size and shape of cavities and reduced control and precision of movement create perceptual differences from the phonemes produced by the adult. This has been well recognized as a difficulty in making written transcripts of infant sound production using International Phonetic Alphabet notation. The examiner should classify sounds produced by the child into their general sound-movement categories without concern for exact phonetic transcription.

The Sound Play section of the Pre-Speech Assessment Scale represents a combination of the movements which the child produces with the oral mechanism (which are also tested in the feeding categories), and their coordination with the respiratory-phonatory system. It is, therefore, a category which probably explores the more complex aspects of the child's use of movement. It is the category which is most likely to correlate with later speech production. Sharp discrepencies between the child's use of oral movements in feeding and use of oral movements during phonation should be interpreted in light of respiratory-phonatory support for speech. If the child shows good oral control during feeding but poor use of these movements to produce sound play variations, it may be related to inadequacies in the production and control of phonation. This should be reflected in the lower scores on the Respiration-Phonation subcategories. When both oral movements in feeding, and the child's use of respiration-phonation are at similar levels (particularly when there are no abnormal components or these are minor), other explanations for limited or abnormal sound play must be sought. Clinical experience suggests that many children with large discrepancies between use of oral movements in feeding and in sound play later develop the motor planning deficits characteristic of children with apraxia.

### Relationship to Pre-Speech and Communication Function

Relationships between early sound production and meaningful speech development are only speculative. The Pre-Speech Assessment Scale is built upon the premise that early adjustments and valving of the oral tract may be derived from movements and coordinations developed during feeding. Gradually these movements occur as the child vocalizes and produce an increasingly varied repertoire of vowels and consonants. The early cooing and babbling patterns of the normal infant provide a continuity of sound production from the earliest months to the production of meaningful speech. Through her early experience with movement and sound, the infant develops the pre-speech features of alternation between opening and closure of the vocal tract, of contrasts in resonance types, and of timing constraints on the relationships between these openings and closures. As different consonants and vowels become sequenced, the child develops contrasts of consonantal and vocalic types. It is hypothesized that the child develops the sensori-motor patterns and feedback of an extensive number and variety of articulatory positions and movement transitions which become audible. It is from these that meaningful speech evolves.

## VI. SOUND PLAY

### Common Definitions

The following definitions of terms apply to all or most of the categories in the Sound Play Section. For purposes of conservation of space and increased clarity, they will be provided for the examiner only at the beginning of this section.

a) Phonation is defined as the production of voiced sound caused by a column of air moving upward in the trachea meeting a pair of vocal folds pulled together to interrupt the air flow. The balance between these two forces results in phonation which can be adjusted in pitch, intensity and quality.

b) Crying is defined as a sustained or intermittent vocal sound which expresses a child's basic emotions or the communication of hunger, anger, fear, pain, or other somewhat negative reaction.

c) Distress vocalization or fussing is a less active form of crying which shares many of its features. Since it differs from crying primarily in the feature of duration, it should not be included within the testing of duration of phonation. It may be considered a form of cry behavior for all other sections.

d) Non-crying phonation is defined as the production of voiced sound in the more positive emotional reactions of squealing, laughter, chuckling, vowels, single consonant-vowel syllables, sequenced consonant-vowel combinations, words, phrases, and sentences.

e) Non-speech phonation is defined as any vocalization which the child produces which would not be considered a word, phrase or sentence. This would include crying, distress, laughing, squealing, pleasurable vocalizations without the clear-cut quality of a vowel or consonant, vowels, single consonant-vowel syllables, or sequenced consonant-vowel combinations.

f) A vowel is a continuous sound which is produced by resonance in a relatively open cavity or tract. Vowels are always voiced and produced with some degree of mouth opening. English vowels are all produced with elevation of the soft palate so that the vocal tone is emitted from the mouth rather than the nose. Vowels may occur as a single sound or unit or may occur in long broken or unbroken strings with the presence of syllabification, stress, and intonation patterns.

g) A consonant is a speech sound produced with or without voicing by contraction of the tongue, lips, palate, and pharynx in such a way that the air stream or vocal tone is interrupted or obstructed.

h) A single consonant-vowel syllable is defined as the presence of a syllable containing a minimum of one consonant and one vowel (CV). The syllable may also have variations which include the addition of a second consonant at the end of the syllable (CVC) or the initiation of the syllable with a vowel (VC). The term, syllable, implies specific timing relationships and constraints on the relationship of openings and closures. In the early stages in which a consonant and vowel are combined (i.e., in the development of alternation of full opening and closure of the vocal tract) the timing aspects of the syllable have not yet developed. This stage of early development has been referred to as marginal babble (Oller). For ease of scoring, the term CV syllable will be used in the Scale to refer to the single combining of a consonantal element with a vowel element whether or not the timing constraints of the syllable have been developed.

i) Sequenced consonant-vowel combinations is defined as the sequencing or chaining of two or more consonant-vowel syllables (CVCV) with a timing which more closely resembles the syllables of speech. The syllables may contain a repetition or reduplication of the same syllables ($C_1V_1C_1V_1$) in which both the consonants and vowels are the same. They may be varied so that either the consonant or vowel or both are different ($C_1V_1C_2V_2$ or $C_1V_1C_1V_2$ or $C_1V_1C_2V_1$).

These syllables may be produced with a simple chaining of syllables and a fairly even rhythm and flat or falling intonation pattern. Or they may occur as a long succession of syllables which have stress and intonation patterns resembling meaningful speech. The latter jargon-like patterns often appear to be the child's attempt to give some flow or continuity to adult-like speech attempts in connecting the few words he or she can produce.

j) A word is defined as a sound or series of sounds which carry definite meaning for the child and the parents or other listeners. The labeling of a consonant-vowel utterance as a word implies that the child is using the sounds consistently in an attempt at meaningful communication.

k) Word combinations, phrases, and early 2-3 word sentences are defined as the meaningful combining of two or more words in a manner which carries meaning to the child and the listener. It does not include the simple naming of several single items, each of which might serve as a single word "sentence" to the child. Although pauses may occur between the two words, they are related in a manner characteristic of early sentence development.

## VI. SOUND PLAY

### Common Testing Procedure

The following testing procedure applies to all of the categories in the Sound Play Section. For purposes of conservation of space and increased clarity, they will be provided for the examiner only at the beginning of this section.

The child should be observed throughout the evaluation session(s). If there seems to be any difficulties producing voice, the child should be placed in the physical position where the postural tone is most normal and phonation is the easiest. Specific preparation of the child through movement, inhibition of shoulder girdle hypertonicity, use of vibration facilitation or other inhibitory or facilitatory techniques should not be done.

If sound play does not occur or is limited during the evaluation or treatment sessions, a tape recording of the child's vocalization at home or school may be used. Written instructions for making the recording should be given to the parent or teacher (Appendix H). This should be used only to supplement the examiner's direct observations since scoring for many of the categories depends upon visual observation of the movement of the articulator during phonation. Parental reports may be included in the narrative portion of the evaluation. They may only be used for scoring in the category Type of Spontaneous Sound Play.

If the child is producing words and sentences, she should be given a simple naming task with a specified group of animal words and simple phrases at the meaningful speech level. This should be supplemented with the elicitation of animal sounds and environmental noises at the non-speech level. Where possible, spontaneous utterances should be elicited rather than imitated responses. This will assist in determining the influence of meaningfulness and structural complexity on the child's successful performance. Specific materials and instructions for their use are provided in Appendix I. This specifically elicited vocalization may be supplemented by other vocalizations or words which may occur spontaneously. The child's phonatory patterns should be tape recorded for later scoring.

## VI. SOUND PLAY

### Common Scoring Information

The following scoring information applies to all or most of the categories in the Sound Play Section. For purposes of conservation of space and increased clarity, they will be provided for the examiner only at the beginning of this section.

a) Questions in scoring may arise when the child has reached a stage of linguistic production in which his only utterances are words and early sentences. Attempts should be made to obtain non-meaningful phonation from the child (i.e., animal sounds, environmental noises, babble-like code games). If an adequate amount of non-meaningful sound production at different levels of structural complexity cannot be elicited, the examiner faces a dilemma for scoring and interpretation of the results and their implications as a pre-speech predictor. The stage of development in which two or more consonant-vowel combinations are sequenced in a timing framework has been thought to provide the timing structure for later speech syllable development and the sustained flow of speech. How does one score or deal with the child who has reached a word level of sound production which satisfies the CV syllable requirement at the word level but does not produce and CVCV utterances? (The history of many of these children will show lack of or limited experience with multi-syllable utterances at the non-speech level). At one level, the child has successfully carried over or attempted to use the articulatory feature at a meaningful level. On the other hand, an aspect of structural complexity occurring at a lower level may have been omitted or not experienced. It is not known how seriously this will affect full speech production skill at a later point in development.

   For scoring the child who does not meet the 9-month criteria of producing sequenced consonant-vowel combinations (CVCV) and has words which satisfy the 15-month criteria for single consonant-vowel syllables (CV) in words, the following rationale and procedures for scoring will be used.

   1. The pre-speech capability being measured is an aspect of sound play or early articulatory control. If the child's failure to produce any utterances in which there is a sequence of consonant-vowel combinations is related to an aspect of control of the articulator (i.e., jaw, tongue, lip, velopharynx), this should be taken into consideration in scoring an aspect of sound play development. If the failure to produce CVCV utterances is related to a limitation in respiratory-phonatory control, this should not penalize the child in his scores in the sound play category.

   2. The respiratory-phonatory feature most likely to affect the child's ability to use sequenced articulatory movements is that of duration of phonation. Therefore, if the child does not produce CVCV utterances and has a duration of under 1-2 seconds, one may presume that this aspect of phonatory control will influence his later speech development through limiting the number of syllables or words which can be sequenced.

   3. If there is inadequate duration of phonation to support single words (i.e., less than 1-2 seconds) and the child does not produce syllables or words containing sequenced consonant-vowel combinations, he would be given a score at the 15-month word level if all aspects of articulator movement for the category were met at the 75% criterion level.

   4. If the duration of phonation is adequate at the word level (i.e., sustained for 1-2 seconds or until the end of the word), one may presume that phonation is adequate to support sequenced consonant-vowel combinations. The problem in this case is probably related to a problem of sound production or articulation. Since this represents a problem in the sound production category being scored, the child would not receive a score at the 15-month level for the words he was producing with a CV structure. Even though this technically satisfies the criterion at the 15-month level (i.e., words with either a CV or CVCV structure), the child has not met the prior criterion at the 9-month level for producing non-meaningful sequenced consonant-vowel combinations. His normal score (if there were one) would lie between 6 months and 9 months.

5. a. If the child had a totally normal sound production system, one could presume that the speed of articulation could be increased automatically to compensate for inadequate duration of phonation. For this reason, if the child is given a normal score between 15 and 18 months without the presence of CVCV syllables, an abnormal score of at least -1 should be given also.

   b. If the child continues to produce only words and no non-meaningful utterances are produced, the scoring should be based upon the speech utterances. No score would be given in the normal area unless the child met the 75% competency level for words.

   c. The child must satisfy all criteria listed at the 18-month level to receive the score. If respiratory-phonatory control interfered with the ability to produce CVCV syllables in words, this should be noted in the narrative, but the child could not receive full credit in the sound play category.

#23. TYPE OF SPONTANEOUS SOUND PLAY

Testing Procedure

Observe the type of spontaneous sound play which occurs throughout the evaluation and during treatment sessions. Question the parents extensively about the type of sound play which occurs at home. Ask them to listen carefully and note the types of sound combinations which are heard and examples of each. A tape recording of the child's spontaneous sound play may be used as well. The parental report of the type of sounds produced in play may be used in scoring the child if the examiner feels that the parents are able to make the necessary distinctions. If scoring is based on parental report, this should be indicated in the narrative portion.

Specific Scoring Information

a) Spontaneous sound play refers to the production of vowels and consonants singly or in combinations which is not the result of direct imitation or manual assistance of the examiner with mouth position or breathing and voicing. In addition, the sound has a playful or interactive aspect as if the infant was enjoying or experimenting with various aspects of the voice. It may be used as a means of interaction with others in the environment. Sound play does not include mechanical or reflexive expressions of discomfort or comfort which may be heard during the first weeks or month in the normal infant although these sounds may lead to the development of vowels and consonants.

b) A vowel-like utterance is often produced by very young infants. This is described as a prolonged voiced sound which may be quite nasalized or which cannot be identified as a specific vowel but is more like a vowel than a consonant.

c) It is often difficult to categorize the sound production of the older, more intelligent child who produces long strings of vowel or vowel and consonant sounds which are not always intelligible as words. In a linguistic and cognitive sense, it may be difficult to conceive of these utterances as falling into a category of sound play. However, many of these children may be using non-word sound series as fillers between the words which they can produce. This most frequently occurs in many athetoid cerebral palsied children who may have difficulty gaining consistency in word production and in control of respiration-phonation for longer sentences. If it appears to the examiner that the child is using filler sounds or non-word sound sequences, a score for this category below 18 months would be given. The exact score would depend upon the structure and content of his non-speech material.

d) Guidelines for Use of a -1 Score: Some of the mildly abnormal components or type of spontaneous sound play which could be scored as a -1 would include: a very low frequency of the sound play types which are present; limited variability in consonant and vowel types within the sound play type.

e) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the amount of variability of vowel; consonant and syllable production; the general frequency with which the sound play type is used; the occurrence of more advanced emerging patterns.

#23. TYPE OF SPONTANEOUS SOUND PLAY

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough non-crying phonation to evaluate function. The lack of voicing is due to severe problems of neuromuscular coordination. Non-crying phonation occurs with extremely low frequency.<br>OR<br>b) Child is chronologically and developmentally over three months. Child has 1 or 2 infrequent, reflexive sounds with no sound play aspects or intent. Child may produce reflexive expressions of comfort or discomfort. Laughing or squealing may occur. |
| -7 | Child may have a history of infrequent or extremely limited variety of sound play production. There is currently no spontaneous play with sounds. There is little or no spontaneous speech, but the child will occasionally repeat a simple word on demand or in imitation. |
| -5 | Child may have a history of infrequent or extremely limited variety of sound play production. There is currently no spontaneous play with sounds. Child uses sentences or words spontaneously but these have an extremely limited variety in sound production. |
| -3 | Child engages in some sound play. Sound play is limited in frequency and the sounds used are limited in type or variety. |
| -1 | The type of sound play shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough non-crying phonation to evaluate function. This is due to chronological age, retardation, emotional disturbance, deafness, or other medical or behavioral reasons not related to a primary disorder of sound production. |
| 1 month | Vocalizations consist of small mewing sounds of pleasure during or following feeding or other similar vocalizations used to express early feelings of satisfaction or dissatisfaction. Some beginnings of vowel production may be heard. |
| 3 months | Sound play consists of vowels or vowel-like utterances (i.e., ah, uh, oo). |
| 5 months | Sound play consists of vowels or vowel-like utterances plus single consonants or consonant-like utterances such as raspberries, trills and squeals which may be used in a playful or exploratory manner (i.e., m-m-m,th-th-th, p-p-p) |
| 6 months | Sound play consists of vowels, occasional single consonants plus clear consonant-vowel syllables (CV or CVC) (i.e., ba, ma, di, aba, igi). |
| 9 months | Sound play consists of clear consonant-vowel combinations with a series of the same consonant and vowel sounds (i.e., ba-ba-ba, ga-ga-ga) (CVCV). |
| 12 months | Sound play consists of clear consonant-vowel combinations with the combining of 2 or more different syllables (i.e., ba-bo, mi-di, bi-da) (CVCV) |
| 15 months | Sound play consists of sentence-like utterances consisting of a mixture of 4 or more syllables (V, CV, CVCV). These utterances do not carry the meaning of words or sentences but contain stress and intonation patterns which sound like meaningful phrases or sentences. Both consonants and vowels are included in these utterances. |
| 18 months | Child does not participate in spontaneous sound play but uses single words or phrases which contain a variety of sounds. |

#24. JAW MOVEMENT DURING PHONATION

The basic testing procedure for evaluating sound play (see page 121) should be followed. The examiner should observe the child's jaw position and type of movement used during non-crying phonation.

Specific Scoring Information

a) A jaw thrust is defined as a strong downward extension of the lower jaw during phonation. The mouth may appear to be fixed in the open position and may come unstuck with a jerk when the child stops thrusting. The strength and tension involved differentiate the jaw thrust from the normal full opening of the jaw which occurs in the normal infant. Thrusting may occur as the child attempts to phonate and then cease once voicing begins. Or it may continue as the child phonates. Thrusting may occur at the end of an utterance as phonation is lost.

b) Jaw clenching implies that the jaw is tightly closed during phonation.

c) Jaw retraction is defined as the pulling back of the lower jaw so that the molars do not make proper contact when the jaw is in the closed position. Although this could be due to structural problems, scoring for jaw retraction applies only to retraction on the basis of changeable muscle forces.

d) Jaw protrusion is defined as the pushing forward of the lower jaw so that the molars do not make proper contact when the jaw is in the closed position. The lower incisors usually come up over the upper incisors. Although this could be due to structural problems, scoring for jaw protrusion applies only to protrusion on the basis of changeable muscle forces.

e) A mandibular facet slip occurs when the condyloid process of the mandible slips out of the temporo-mandibular joint causing the jaw to slightly dislocate as it slips out of position. The mandibular facet slip may occur in a forward motion (protrusion), in a backward direction (retraction), or in a sideward direction (lateral deviation). In each case, it must be distinguished from simple protrusion, retraction, or lateral deviation occurring as a movement pattern or fixed position without the strong slippage at the temporo-mandibular joint.

f) Jaw deviation to the side or lateral deviation is the shifting of the lower jaw out of midline to one side due to unequal pull of the muscles responsible for opening the jaw. Although the jaw may pull to the side in a mandibular facet slip, it should not pull so hard as to become slightly dislocated if a score in the normal range is given.

g) Grading of jaw movement is defined as the ability to make small and smooth changes and adjustments in jaw movement during phonation. The child is able to achieve and hold a wide variety of jaw positions between full-open and full closed and the movement in the mid-ranges is smooth and controlled.

h) Jaw stability is important in the achievement of fine gradations of tongue and lip control in the production of vowels and consonants. A lack of jaw stability in a holding position is seen in many cerebral palsied children particularly those of the athetoid and ataxic types. Small amounts of involuntary or ungraded jaw movements may occur as the child phonates and may interfere with the clarity and/or speed of speech production. Slight degrees of lateral movement are seen in the normal preschool child.

i) A vowel category consists of a group of vowels which share a set of common characteristics in the placement or movement patterns of the tongue and jaw. The height of the tongue in the mouth and secondarily the amount of jaw closure determines the distinction of high vowels, central vowels and low vowels. The movement from one vowel position to another is characteristic of diphthongs:

| High vowels include: | Central vowels include: | Low vowels include: | Diphthongs include: |
|---|---|---|---|
| /i/ as in see | /e/ as in say | /æ/ as in cat | /aɪ/ as in my |
| /ɪ/ as in hit | /ɛ/ as in pet | /ɔ/ as in all | /aʊ/ as in cow |
| /u/ as in food | /ə/ as in up | /ɑ/ as in father | /ɔɪ/ as in boy |
| /ʊ/ as in foot | /o/ as in no | | |

j) The normal infant has initial difficulties in controlling the variability of jaw position. Difficulties with holding a position for a vowel or the use of a full-open ungraded jaw movement may occur in the child under 6-8 months. This however, does not occur in a frequency above 75% which would be scored as -4a or -4c. If the child under 8 months shows problems with control or variability of jaw position or movement which is less than 75%, he should not receive an abnormal score. Lower frequencies should be scored between -3 and -1 in an older infant or child.

k) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of jaw movement during phonation which could be scored as a -1 would include: limitations in the amount of jaw opening due to problems of the temporo-mandibular joint; limitations in the number of jaw positions produced; awkwardness or delays in movement suggesting an apraxia; failure to produce words with a CVCV structure when there is vocal duration of less than 1 second (see p. 123, 5a ).

l) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the frequency with which abnormalities of jaw control occur; the complexity of jaw movements required and produced; the complexity of movement transitions; the occurrence of more advanced emerging patterns.

#24. JAW MOVEMENT DURING PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough non-crying phonation to evaluate jaw movement. The lack of voicing is due to severe problems of neuromuscular coordination. Attempts at non-vocal communication or vocalization produce abnormal jaw movements (i.e., jaw thrusting, jaw retraction, jaw protrusion, jaw clenching, strong lateral deviation, severe hypotonicity or flaccidity and/or mandibular facet slip).<br>OR<br>b) Abnormal jaw movements (described under a.) occur more than 75% of the time when the child attempts to initiate or sustain non-crying phonation. |
| -7 | Abnormal jaw movements (i.e., jaw thrusting, jaw retraction, jaw protrusion, jaw clenching, strong lateral deviation, marked hypotonicity or muscle weakness) occur less than 75% of the time when the child attempts to initiate or sustain non-crying phonation. |
| -4 | Child produces vowels, vowels and consonants, or words. Very little control or variability of jaw position or movement is seen in sound play, words, or phrases. This may be observed more than 75% of the time in one or more of the following:<br>a) The jaw moves toward an exaggerated open-mouth position with a lack of well-graded movement. This, however, does not have the suddenness or strength which would classify it as a jaw thrust.<br>OR<br>b) The jaw is in a closed-mouth position with little variation and lack of graded movement toward a more open position. This does not have the strength of closure which would classify it as jaw clenching.<br>OR<br>c) The jaw is unable to remain stable in holding a position for vowel or consonant production. Small amounts of involuntary and ungraded jaw movements are observed as the child attempts to produce different consonants or vowels or consonant-vowel sequences in babbling or words. |
| -1 | Jaw movement during phonation shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough non-crying phonation to evaluate jaw function. Non-vocal communication and phonation which does occur does not contain abnormal jaw movements. This is due to chronological age, prematurity, retardation, emotional disturbance, deafness, or other medical or behavioral reasons not related to a primary disorder of jaw movement during phonation. |
| 1 month | Child produces early reflexive non-crying sounds, pleasure sounds or one or two vowels with normal jaw movement. |
| 3 months | Child produces 3 or more different vowels with normal jaw movement. |
| 6 months | Child produces 3 or more vowels (V or CV structure) with normal jaw movement. Vocalization includes high vowels, central vowels, low vowels and diphthongs. The child is able to sustain a stable jaw position while vocalizing a single vowel and is able to move from one vowel to another in a smooth manner and without involuntary and ungraded jaw movements. |
| 9 months | Child is able to use smoothly sequenced jaw movements when sequencing consonant-vowel combinations (CVCV). |
| 15 months | Child is able to produce words with a CV or CVCV structure while sustaining a stable jaw position or while moving from one vowel or consonant to another in a smooth manner. |
| 18 months | Child is able to produce words with high, central and low vowels and diphthongs with no abnormal jaw movements. Words contain both single consonant-vowel syllables (CV or CVC) and sequenced consonant-vowel combinations (CVCV). Lateral jaw deviation occurs less than 50% of the time or not at all. |

#25. TONGUE MOVEMENT DURING PHONATION

Testing Procedure

The basic testing procedure for evaluating Sound Play (see page 121) should be followed. The examiner should observe the child's tongue position and type of movement used during non-crying phonation.

Specific Scoring Information

a) Tongue thrust is defined as a forceful protrusion of the tongue from the mouth. It is generally seen as a stronger movement than the slight protrusion seen in normal infantile swallowing or the easy in-and-out movement of the tongue seen in suckling. The tongue often appears thick or bunched during the thrust. Tongue thrusting can occur during phonation and can interfere with the production of vowels and consonants produced with the tongue.

b) Exaggerated tongue protrusion is defined as an extension-retraction movement pattern which has an exaggerated amount of protrusion. The tongue generally moves beyond the borders of the lips. It does not have the forcefulness of the protrusion seen in the tongue thrust. Exaggerated protrusion can occur during phonation and interfere with the production of vowels and consonants produced with the tongue.

c) Extreme tongue retraction is defined as the pulling backward of the tongue into the pharyngeal area. The tongue may be somewhat immobile with a bunched elevation of the back of the tongue and depression of the front of the tongue. Extreme tongue retraction occurring during phonation can interfere with the production of vowels and consonants produced with the tongue.

d) Hypotonia of the tongue is defined as marked low tone in the tongue which contributes to little or no movement of the tongue during phonation. The tongue may appear to be larger than normal because of its lack of muscle tone. Actual tongue paralysis will cause lack of movement and flaccidity.

e) Tongue deviation or asymmetry is defined as the pulling of the tongue toward the right or left side of the mouth during phonation. The asymmetry may also be observed as an off-center elevation of the tongue as the child attempts to produce sounds such as /t/, /d/, /n/, or /l/ which require symmetrical action of muscles on both sides of the midline of the tongue to get tongue-tip elevation.

f) Involuntary tongue movement is defined as extraneous movement of the tongue which is unintentional and may interfere with precise tongue movement for speech. Two types of involuntary movement may be observed. The first is a more regular tremor or rapid quivering type of movement. The second is a more random type of motion in which alternations between protrusion and retraction and/or lateral deviation are less predictable. Some of the latter movements may resemble a suckling movement of the tongue as the child phonates. In both of these patterns there is not a strong degree of tension and the movement has an easy flow. Involuntary tongue movements may be combined with the more tense or static patterns of tongue retraction, tongue thrust, or strong lateral deviations.

g) Early reflexive non-crying closures of the vocal tract consist of a series of tongue clicks, stops and friction noises produced by the tongue. These are vegetative noises which are usually voiceless.

h) Consonants produced with the front of the tongue include /t/, /d/, /n/, and /l/.

i) Consonants produced with the back of the tongue include /k/, /g/, and /ng/.

j) Fricative consonants are produced by the passage of air through constrictions or narrowing of the vocal tube. Fricatives produced when the constriction of the airway is produced by the tongue include /s/, /z/, /sh/, /zh/, /th/.

k) If the child shows tongue movement and is able to produce some vowel differences and consonants using the tongue, she should not be scored -9b on the basis of hypotonic muscle tone. This category of scoring should be used only when the hypotonia is severe enough to interfere with movement itself.

l) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of tongue movement which could be scored as a -1 would include: very poor approximations of consonants and vowels; the impression that primary changes in vowel production were occurring through jaw action rather than tongue; the use of the anterior blade of the tongue and palatal contact for tongue-tip sounds even when they are perceptually correct; bunching of the tongue with poor spreading or flattening; poor speed and timing of tongue movement; awkwardness, movement delays or inconsistencies in sequencing of tongue movements which might suggest an apraxia; inter-dentalization of tongue-tip elevated consonants; asymmetry of tongue movement; failure to produce words with a CVCV structure when there is vocal duration of less than 1 second (see page 123, 5a ).

m) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the frequency with which abnormalities of tongue movement occurs; the complexity of tongue movement transitions produced by the child; the occurrence of more advanced emerging behaviors.

#25. TONGUE MOVEMENT DURING PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough non-crying phonation to evaluate tongue movement. The lack of voicing is due to severe problems of neuromuscular coordination. Attempts at non-vocal communication or vocalization produce abnormal tongue movements (i.e., tongue thrust, tongue retraction, severe hypotonicity or flaccidity and/or strong lateral tongue deviations or asymmetries).<br>OR<br>b) Abnormal tongue movements (described under a.) occur more than 75% of the time when the child attempts to initiate or sustain non-crying phonation. |
| -7 | Abnormal tongue movements (i.e., tongue thrust, tongue retraction, marked hypotonicity or weakness and/or strong lateral deviations or asymmetries) occur less than 75% of the time when the child attempts to initiate or sustain non-crying phonation. |
| -4 | Child produces vowels, vowels and consonants, or words. Very little control or variability of tongue position or movement is seen in sound play, words, or phrases. This may be observed more than 75% of the time in one or more of the following:<br>a) The tongue shows a quivering type of involuntary motion during phonation.<br>OR<br>b) The tongue remains passive and hypotonic on the floor of the mouth with little or no movement during phonation.<br>OR<br>c) The tongue is unable to remain stable in a holding position for production of a given vowel or consonant. The tongue shows a random type of involuntary motion which involves an easy, non-tense flow of motion.<br>OR<br>d) The tongue shows exaggerated protrusion during phonation or shows a forward-backward, in-and-out movement as the child phonates. Protrusion is easy and resembles either a suckling pattern or the movement of the exaggerated protrusion or normal protrusion during swallowing rather than a tongue thrust.<br>OR<br>e) The tongue is held and moved in a back position in the mouth during phonation. This may increase the listener's perception of nasality. The movement pattern is easy and non-tense. There is not the strength of retraction nor the blockage of the oro-pharyngeal air space which would classify it as a strong tongue retraction. |
| -1 | Tongue movement during phonation shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough non-crying phonation to evaluate tongue function. Non-vocal communication and phonation which does occur does not contain abnormal tongue movements. This is due to chronological age, prematurity, retardation, emotional disturbance, deafness, or other medical or behavioral reasons not related to a primary disorder of tongue movement during phonation. |
| 1 month | Child produces early reflexive non-crying closures of the vocal tract which may resemble consonants (i.e., stops, clicks, friction noises). These are vegative sounds produced by tongue position or movement. |
| 3 months | The child produces at least two normal tongue configurations or movements (i.e., elevation of front or back of the tongue, spreading, depression) in the production of vowels. The consonants /g/, /k/, or /ng/ may occur due to elevation of the back of the tongue. |
| 6 months | Child produces consonants with elevation of the front 1/3 of the tongue. This occurs in single consonant-vowel syllables (CV) (i.e., da, ti, nuh, la) or in sequenced combinations (CVCV) (i.e., da-da, ni-ni). |
| 9 months | Child produces consonants with both the front and back of the tongue. These occur in both single consonant-vowel syllables (CV) (i.e., da, gi, ka, to) and in sequenced consonant-vowel combinations (CVCV) (i.e., da-da-da, da-ga, da-ga-ga). Fricatives (i.e., sh-sh; iff; th-th-th) are produced in single consonants or in syllables with a CV, VC or CVCV structure. |
| 15 months | The child produces words containing consonants produced by either the front or back of the tongue (i.e., dog, night, book, kitty, daddy, night-night). |
| 18 months | The child produces words containing consonants produced by both the front and back of the tongue. Words contain both single consonant-vowel syllables (CV) and sequenced consonant-vowel combinations (CVCV). Fricatives are produced in either non-speech phonation or words. |

## #26. LIP MOVEMENT DURING PHONATION

### Testing Procedure

The basic testing procedure for evaluating Sound Play (see page 121) should be followed. The examiner should observe the child's lip position and type of movement used during non-crying phonation.

### Specific Scoring Information

a) Lip retraction is defined as the drawing back of the lips so that they form a tight line over the mouth. In this position, it becomes difficult for the lips to make contact with each other, to round or to have the general flexibility needed for speech.

b) Purse-string action of the lips is defined as a variation of lip retraction in which the child appears to counteract the basic pattern of pulling back by pursing the lips forward. This results in a tight semi-retracted pattern in which the orbicularis oris muscle surrounding the lips seems to be contracting in a drawstring type of action as is seen in cloth purses with a drawstring. The lips have a puckered look and are both rounded and retracted.

c) Hypotonia of the lips is defined as marked low tone in the lip and cheek muscles which contributes to little or no movement of the lips during phonation. The lips are usually in an open position at rest and often do not make mechanical contact during upward jaw movement. Lip paralysis will also cause lack of movement and flaccidity.

d) Involuntary lip movement is defined as extraneous movement of the lips which is unintentional and may interfere with precise lip movement for speech. Two types of involuntary movement may be observed. The first is a more regular tremor or quivering type of movement. The second is a more random type of motion in which the alternations between easy protrusion and retraction and/or lateral deviation is less predictable. In both of these patterns there is not a strong degree of tension and the movement has a somewhat easy flow to it. Involuntary lip movements may be combined with the more static patterns of lip retraction or purse-string action.

e) Early reflexive non-crying closures of the vocal tract consist of a series of lip smacks, stops and friction noises produced by the lips. These are vegetative noises which are usually voiceless.

f) Lip spreading is defined as the movement of the corners of the lips in a sideward or lateral direction during phonation. This type of lip activity is needed for production of the vowels in words such as "me," "pet," and "hit."

g) Lip rounding is defined as the movement of the lips in a forward and rounded direction during phonation. This type of lip activity is needed for production of vowels in words such as "no," "shoe," "put," and the semi-vowel "w."

h) Bilabial contact and release of the lips is defined as the movement of the lips toward each other so that upper and lower lips meet and maintain sustained or momentary contact during phonation. This type of lip activity is needed for production of the consonants /m/, /p/, and /b/ in single consonant-vowel syllables (i.e., ma, pa, ba).

i) Labio-dental contact with fricative production is defined as the contact of the upper incisors or gums against the lower lip which obstructs the air flow and produces friction noises. This type of lip-teeth activity is needed for the production of the consonants /f/ and /v/.

j) Timing of movement, the precise amount of lip spreading or rounding, and the amount of pressure contact of the two lips can influence the listener's perception of the vowel or consonant produced by the child. In many instances the child appears to be producing the correct vowel or consonant but it may sound somewhat inaccurate or perceptually incorrect.

k) If the child shows lip movement and is able to produce some vowel differences and consonants using the lips, a score of -9b on the basis of hypotonic muscle tone in the lips should not be given. This category of scoring should be used only when the hypotonia is severe enough to interfere with movement itself.

l) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of lip movement during phonation which could be scored as a -1 would include: very poor approximations of consonants and vowels; awkwardness or delays or inconsistencies in sequencing of lip movements which might suggest an apraxia; poor speed or timing of lip movements; failure to produce words with a CVCV structure when there is a vocal duration of less than 1 second (see p. 123, 5a).

m) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the frequency with which abnormalities of lip movement occurs; the complexity of lip movement transitions produced by the child; the occurrence of more advanced emerging patterns.

#26. LIP MOVEMENT DURING PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough non-crying phonation to evaluate lip movements. The lack of voicing is due to severe problems of neuromuscular coordination. Attempts at non-vocal communication or vocalization produce abnormal lip movements (i.e., lip retraction, purse-string action, or severe hypotonicity or flaccidity).<br>OR<br>b) Abnormal lip movements (described under a.) occur more than 75% of the time when the child attempts to initiate or sustain non-crying phonation. |
| -7 | Abnormal lip movements (i.e., lip retraction, lip purse-string action, or marked hypotonicity or weakness) occur less than 75% of the time when the child attempts to initiate or sustain non-crying phonation. |
| -4 | Child produces vowels, vowels and consonants, or words. Very little control or variability of lip position or movement is seen in sound play, words, or phrases. This may be observed more than 75% of the time in one or more of the following:<br>a) The lips show a quivering or tremor-like type of involuntary movement during phonation.<br>OR<br>b) The lips remain passive due to mild hypertonicity or mild hypotonicity with little or no movement during phonation.<br>OR<br>c) The lips are unable to remain stable in a holding position for production of a given vowel. The lips show a random type of involuntary motion often described as facial grimacing. This involves an easy flow of movement which is generally non-tense. |
| -1 | Lip movement during phonation shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough non-crying phonation to evaluate lip function. Non-vocal communication and phonation which does occur does not contain abnormal lip movements. This is due to chronological age, prematurity, retardation, emotional disturbance, deafness, or other medical or behavioral reasons not related to a primary disorder of lip movement during phonation. |
| 1 month | Child produces early reflexive non-crying closures of the vocal tract which may resemble consonants (i.e., stops, friction noises, lip smacking). These are vegetative sounds produced by lip position or movement. |
| 3 months | The child produces one of the following, with normal lip movements, during non-crying phonation:<br>a) Lip spreading.<br>b) Lip rounding.<br>c) Bilabial lip contact and release. |
| 6 months | The child produces two of the following, with normal lip movements, during non-crying phonation:<br>a) Lip spreading.<br>b) Lip rounding.<br>c) Bilabial lip contact and release.<br>d) Labio-dental contact with fricative production. |
| 9 months | Child produces sequenced consonant-vowel combinations (CVCV) with bilabial contact and release (i.e., ba-ba, ma-ma, pa-pa) or labio-dental fricatives (va-va, uf-uhf). |
| 12 months | All four normal lip movements (i.e., rounding, spreading, bilabial contact and release, labio-dental fricatives) are produced in single consonant-vowel syllables (CV) or sequenced consonant-vowel combinations (CVCV). The child may not have achieved correct amount of pressure,contact, timing, or totally correct amounts of rounding and spreading for the vowels and consonants to be perceptuallv correct by adult standards. |
| 15 months | Lip spreading, lip rounding, and bilabial contact and release occur in words with a CV or CVCV structure. The child may not have achieved the correct amount of pressure, contact, timing, or correct amounts of rounding and spreading for the vowels and consonants to be perceptually correct by adult standards. |
| 18 months | The child produces lip spreading, lip rounding, bilabial lip contact and release and labio-dental fricatives in words with both a single consonant-vowel syllable (CV or CVC) and sequenced consonant-vowel combinations (CVCV). Lip rounding, spreading and the amount of pressure in bilabials and fricatives are perceptually correct to the listener. |

## #27. VELOPHARYNGEAL MOVEMENT DURING PHONATION

### Testing Procedure

The basic testing procedure for evaluating Sound Play (see page 121) should be followed. If possible, observe the child's palatal position and movement during phonation. Since this is unrealistic in the majority of instances, inferences from listening to the child's voice should be used to evaluate the adequacy of velopharyngeal functioning.

### Specific Scoring Information

a) Nasal emission of air occurs when elevation of the soft palate is inadequate or poorly timed with the release of air. Air passes upward and through the nose instead of passing through the oral cavity. The presence of nasal emission of air may be identified by placing a finger or a mirror beneath the nostrils and feeling the air stream.

b) Snorting involves the release of short bursts of air or sound through the nose in a snorting manner. It is commonly heard in individuals with a cleft palate or palatal insufficiency.

c) Nasality or nasal resonance is defined as a voice which sounds as though it is coming through the nose rather than through the mouth cavity. There may or may not be actual nasal emission of air. It often has a honky, whining quality. Nasality may be caused by poor timing of closure of the soft palate or lack of closure as seen in individuals with a short palate or palatal cleft. Nasal resonance may be abnormally increased by tension in the mouth and pharyngeal cavities or by too much tongue retraction. English vowels are produced in a non-nasal or oral manner with good palatal closure.

d) Denasality or lack of nasal resonance is defined as a voice which sounds as though it has a constant head cold. This may be due to an anterior obstruction in the nasal cavity. Or the palate may not open or lower appropriately in the production of the three nasalized consonants of English: /m/, /n/, and /ng/. The child may actually substitute the oral voiced counterpart of the consonants so that a /b/ is heard for /m/, a /d/ for /m/, and a /g/ for /ng/; or the quality is different from that of the oral consonant and has a stuffed head sound to it.

e) A full-resonant vowel pattern is defined as the presence of vowels which are sounded or resonated entirely through the oral cavity. Initially the infant uses nasalized vowels or a quasi-resonant pattern. The full-resonant pattern is present by approximately 6 months.

f) Nasal consonants are those which are produced with a lowered soft palate or velum and nasal resonance. In English these are limited to /m/, /n/, and /ng/.

g) Oral consonants are those which are produced with an elevated soft palate or velum and oral resonance. In English all consonants except the three nasal consonants (m, n, ng) are produced with oral resonance.

h) In evaluating the child's ability to control velopharyngeal position or movement, a careful analysis of patterns of nasality, denasality, and appropriate nasal or oral resonance should be done. Visual analysis of the problem is difficult or impossible in an ordinary clinical setting.

i) Guidelines for Use of a -1 Score: Some of the mildly abnormal components of velopharyngeal movement which could be scored as a -1 would include: nasalization of vowels adjacent to nasal consonants; very poor approximations of nasal or oral consonants so that actual nasality is not heard, only a sloppy semi-nasality; constant voicing of voiceless consonants which may indicate mild problems of velopharyngeal closure (without perception of nasality).

j) Guidelines for Use of Clinical Judgment Scores: Factors to consider when scoring a child between categories would include: the frequency with which abnormalities of nasality occurred; the complexity and frequency of use of sound sequences alternating between oral and nasal consonants; the occurrence of more advanced emerging patterns.

#27. VELOPHARYNGEAL MOVEMENT DURING PHONATION

| SCORE | BEHAVIORAL DESCRIPTION |
|---|---|
| -9 | a) Child is unable to produce enough non-crying phonation to evaluate velopharyngeal movement. The lack of voicing is due to severe problems of neuromuscular coordination. Attempts at non-vocal communication, vocalization, or feeding produce indication of abnormal velopharyngeal movements (i.e., nasal emission of air, snorting, loss of food through the nose, or other indications of velopharyngeal incompetence).<br>OR<br>b) Abnormal velopharyngeal function (described under a.) occurs more than 75% of the time when the child attempts to initiate or sustain non-crying phonation. |
| -7 | Abnormal velopharyngeal function (nasal emission of air, snorting or other indications of velopharyngeal incompetence) occurs less than 75% of the time when the child attempts to initiate or sustain non-crying phonation. |
| -4 | Child produces vowels, vowels and consonants, or words. Very little control of velopharyngeal position or movement is present in non-speech or speech phonation. This may be observed more than 75% of the time in one or more of the following:<br>a) Alternations between oral and nasal production occurs in sound sequences which do not contain nasal consonants (i.e., ba-ba-ba, bye-bye, puppy, go away). This may indicate involuntary movement or fluctuating tone in the velopharynx.<br>OR<br>b) Consistent nasal resonance of vowels and the presence of only nasal consonants in a child above the chronological age of 3 months. This may indicate a passive or inactive velopharynx with inadequate closure.<br>OR<br>c) Nasalization of the vowel or consonant near the end of a word or phrase (i.e., dog = dong; I see a cat = I see a can; I go bed = I go be). This may indicate the inability to sustain velopharyngeal closure until the end of the sequence.<br>OR<br>d) Oral consonants frequently preceded by their nasal conterparts (i.e., ball = mball; dog = ndog; kitty = ngkitty). This may indicate that the timing of velopharyngeal closure is slightly slow.<br>OR<br>e) Oral production of nasal consonants (i.e., lamb - lab; bunny = buddy; I wanna go home = I wada go hob). This may indicate a constant closure of the velopharynx with poor ability to correctly time its opening for nasal consonants if the child doesn't have a problem of nasal congestion. |
| -1 | Velopharyngeal movement during phonation shows mildly abnormal components which may or may not have been previously described. Or the abnormal components occur with extremely low frequency or only under stress or illness. |
| X | The child does not produce enough non-crying phonation to evaluate velopharyngeal movement. Non-vocal communication and phonation which does occur does not contain indications of abnormal velopharyngeal movements. This is due to chronological age, prematurity, retardation, emotional disturbance, deafness, or other medical or behavioral reasons not related to a primary disorder of velopharyngeal movement during phonation. |
| 1 month | Child produces semi-nasal "vowels" and does not show complete velopharyngeal closure. |
| 6 months | Child produces non-nasalized vowels in a fully resonant pattern. Alternation between opening and closing of the velopharynx is present in the production of a nasal consonant and an oral vowel (i.e., ma, na, uhng) within a consonant-vowel (CV) or vowel-consonant (VC) syllable |
| 9 months | Child produces both nasal and oral consonants in sequenced consonant-vowel combinations (CVCV). At least one nasal-oral pair have the same place of articulation (i.e., ma-ba; na-da; ga-ang). These nasal and oral consonants may occur within the same syllable chain or in different syllable sequences (i.e., mama, baba, dano, gaga, ang-ang). The vowels produced are non-nasal. |
| 15 months | Child produces words with either a CV or CVCV structure which contain oral and nasal consonants (i.e., dog, no, see, baby, mama, night-night). Oral and nasal consonants may not appear within the same word or utterance. |
| 18 months | Child produces some words or phrases containing both oral and nasal consonants within the same utterance (i.e., bunny, lamb, go home, my baby). Words contain both single consonant-vowel syllables (CV or CVC) and sequenced consonant-vowel combinations (CVCV). Oral and nasal consonants are used appropriately within the utterance and are perceptually correct to the listener. |

## APPENDIX

A. Pre-Speech Assessment Letter to Parents

B. Questionnaire for Parents

C. Materials Needed for the Pre-Speech Assessment Scale

D. Guiding Questions for the Pre-Speech Assessment

E. Pre-Speech Assessment and Summary of Scores

F. Pre-Speech Graph

G. Summary of Scores for Repeated Evaluations

H. Making a Recording of Your Child's Sounds and Speech

I. Procedures for Eliciting Phonation and Sound Production

J. Recording Sheet for Elicited and Spontaneous Phonation

K. Recording Sheet for Elicited and Spontaneous Sound Production

L. Significant Components of Movement During Feeding

M. References

N. Form: Confusions and Uncertainities in Scoring

APPENDIX A

PRE-SPEECH ASSESSMENT LETTER TO PARENTS

Suzanne Evans Morris, Ph.D.
January, 1982 Edition

## PRE-SPEECH ASSESSMENT

Your child, _____, has been scheduled for a Pre-Speech Evaluation on _____, at _____ o'clock. He/She will be seen by _____, at _____.

A Pre-Speech Evaluation looks carefully at your child's abilities to move the mouth in feeding, at breathing, at the ability to make voice, and at the kinds of sounds and words which are currently used. Information from a pre-speech evaluation helps us to decide whether your child has any physical difficulties which may make talking difficult.

Much of the information which will be helpful to the speech pathologist working with you during the evaluation can be obtained at home through your own observations. We have found that it is easier for parents if they can observe and think about some of the questions before they come. Please observe your child and fill out the attached Parent Questionnaire before you come for the evaluation. Please notice that some of the questions require you to observe your child for 3 to 4 days.

On the day of the evaluation you should bring the following things with you:

1. The Parent Questionnaire
2. A small meal containing food which your child likes:
   a. something soft,such as applesauce, custard, pudding or strained fruit or vegetable;
   b. something lumpy,such as junior food, mashed table food or other solid food if your child has eaten this kind of food before;
   c. something which requires some chewing,such as a piece of meat, raisins, etc.;
   d. something which can be bitten, such as cookie, cracker, pretzel, etc.;
   e. something to drink;
   f. some food which your child has difficulty managing (if he or she does not eat all foods well).
3. Any special feeding equipment which your child regularly uses, such as a special spoon, nipple and bottle, special cup, etc.

Your child should be slightly hungry for the evaluation. Please give some food before coming. However, if your evaluation is scheduled for the hour after breakfast or lunch, the meal should be a light one so that your child will still be interested in eating.

If you have any questions, please call _____,

at _____.

APPENDIX B

QUESTIONNAIRE FOR PARENTS

Suzanne Evans Morris, Ph.D.
January, 1982 Edition

PRE-SPEECH ASSESSMENT

QUESTIONNAIRE FOR PARENTS

CHILD'S NAME: _____ DATE: _____

BIRTH DATE: _____ AGE: _____

I. FEEDING BEHAVIOR

1. Do you feel your child has any feeding problems? How serious do you feel they are?

2. When did you first feel that your child had a feeding problem?

3. What help have you had in managing any problems you or your child has had with feeding?

4. What are your main problems now with feeding?

5. Do there seem to be any behavioral problems around eating? What?

6. How do you handle them?

7. Does your child finger-feed ?

8. What response is given for new tastes? for new smells?

9. What response is given for new textures in food?

10. Is you child still taking the bottle or breast? How often?

PARENT QUESTIONNAIRE

11. Does your child drink from a cup? How many times per day is the cup used?

12. How many times a day do you feed your child? Briefly describe the meals.

II. LENGTH OF TIME REQUIRED TO EAT A MEAL

Count the number of minutes usually spent in feeding your child the largest meal. Do not count the time taken to self-feed or the time you spend playing during the meal. If your child usually self-feeds, feed several meals in order to get an estimate of the length of time needed to eat a meal when fed by another person. The time needed for both liquid and solids should be combined as one meal if the child is taking both.

Number of Minutes: _____

III. AMOUNT OF FOOD EATEN

Estimate the number of ounces of food and liquid which the child eats at the largest meal. A jar of strained food contains 4-1/2 ounces. Two tablespoons equals one ounce. Table foods should be measured by tablespoons or measuring cup.

If the child loses a great deal of food during eating, measure the food served in a measuring cup which indicates the number of ounces served. Estimate how much is lost during eating and subtract this amount from the amount served. Perhaps a plastic bib with a pocket at the bottom could be used. After feeding the child, pour any food or liquid remaining in the dish, cup, or pocket of the plastic bib into the measuring cup.

| DAY | MINUTES | OUNCES | |
|---|---|---|---|
| | | LIQUID | FOOD |
| 1 | _____ | _____ | _____ |
| 2 | _____ | _____ | _____ |
| 3 | _____ | _____ | _____ |
| 4 | _____ | _____ | _____ |

IV. TYPES OF FOOD EATEN BY THE CHILD

1. List foods which your child particularly likes:

2. List foods which your child particularly dislikes:

3. Are there objections to hot foods?

PARENT QUESTIONNAIRE

4. Are there objections to cold foods?

5. Are there objections to spicy foods?

The following definitions should be used for each of the food categories listed in Question 6:

Thin liquids refers to liquids such as water, milk or juice.

Thickened liquids refers to liquids thickened with cereal, pureed fruit, or other substances which make them less fluid. Milk shakes and yogurt would be classified here if they are drunk by the child.

Pureed or smooth soft food refers to solid foods which have been blended, strained, or pureed so that they are smooth but thick. All of the strained commercial baby foods fall into this category. Custards and puddings and ice cream also fall into this category.

Ground or junior foods refers to solid foods which have been passed through a food grinder or have been blenderized to the point where they retain small lumps. Many of the junior commercial baby foods fall into this category. However, junior fruits and many junior vegetables are more the consistency of pureed foods. These should be included in the pureed food category.

Mashed table foods refers to table food which has been mashed with a fork or cut into tiny pieces approximately 1/8 inch in diameter.

Coarsely chopped table foods refers to table food which has been cut into pieces 1/4 inch or larger.

Easily chewed meat refers to meat which is relatively soft and easy to manage. This category includes such meats as hot dogs, luncheon meat, chicken, fish, and hamburgers.

More difficult meat includes meats which are rather fibrous and more difficult to manage such as beef roast, steak, pork chops, lamb chops, etc.

6. Give detailed examples of the foods that your child will eat:

a) Thin liquids:

b) Thickened liquids:

c) Pureed or smooth soft food:

d) Ground or junior food:

e) Mashed table food:

f) Coarsely chopped table food:

g) Easily chewed meat:

PARENT QUESTIONNAIRE

h) More difficult meat:

7. What kinds of food are easiest ? Give examples.

What kinds of food are hardest ? Give examples.

In what way are they easy or difficult?

V. POSITIONS AND EQUIPMENT FOR FEEDING

1. What position do you typically use for feeding the child (i.e., on lap, sitting, on tummy, high chair, booster seat)? Describe.

2. What other positions have you tried?

3. Do you use any special spoons, cups, nipples, etc., for feeding (i.e., latex-covered spoon, preemie nipple, training cup, cut-out cup, etc.)?

VI. MISCELLANEOUS INFORMATION

1. Do you have any problems with brushing your child's teeth? Describe.

2. Does your child bring his or her hands to the mouth? In what position(s) can this be done? (tummy, back, sitting, lying on the side)?

PARENT QUESTIONNAIRE

3. Can your child suck on his or her hands or fingers or use hands to wipe food or saliva from the mouth? Wipe his or her nose with a kleenex? In what position(s) can this be done?

4. Does your child bring toys, food, cup, feeding utensils, or other objects to the mouth?

5. Does your child drool? In what situations do you notice drooling (only when cutting teeth, when lying on the back, on the tummy, sitting, crawling, standing, walking, using hands for dressing, play or drawing, when making sounds or talking)?

VII. SOUNDS PRODUCED BY THE CHILD

1. Does your child cry? Please check the word which describes how much your child cries:

_____ Much _____ A moderate amount _____ Very little _____ Not at all

2. Does your child coo or produce vowel sounds such as "ah," "ooo," "ah-o-i"? Please check the word which describes how much your child makes these sounds:

_____ Much _____ A moderate amount _____ Very little _____ Not at all

3. Does your child make consonant sounds all by themselves such as "mmmmm," "f-f-f-f-f," "dthth"? Please check the word which describes how much your child makes these sounds:

_____ Much _____ A moderate amount _____ Very little _____ Not at all

4. Does your child produce clear combinations of a consonant and a vowel made one time? This would sound like "ba," "muh," "dih," etc. Please check the word which describes how much your child makes these syllables:

_____ Much _____ A moderate amount _____ Very little _____ Not at all

5. Does your child produce clear combinations of a consonant and a vowel made with a series of the same syllables? This would sound like "ma-ma-ma," "dah-dah-dah," "gi-gi," etc. Please check the word which describes how much your child makes these sounds:

_____ Much _____ A moderate amount _____ Very little _____ Not at all

6. Does your child produce clear combinations of a consonant and a vowel made with a series of different syllables? This would sound like "ba-bo," "ma-be," "do-di-boo," etc. Please check the word which describes how much your child makes these syllables:

_____ Much _____ A moderate amount _____ Very little _____ Not at all

PARENT QUESTIONNAIRE

7. Does your child put together a long series of different speech sounds which have the melody pattern of speech and sound like sentences? These sentence-like statements are not really meaningful even though they may contain an occasional word. Please check the word which describes how much your child makes these jargoning sounds:

_____ Much _____ A moderate amount _____ Very little _____ Not at all

8. Does your child produce single words that are meaningful to both of you? Please check the word which describes how much your child uses words:

_____ Much _____ A moderate amount _____ Very little _____ Not at all

9. Does your child put two or more words together into phrases or sentences? Please check the word which describes how much your child uses phrases or sentences:

_____ Much _____ A moderate amount _____ Very little _____ Not at all

10. Describe the situations in which your child is the most vocal or talkative. For example, are more sounds produced when alone?, with another person?, before going to sleep?, when waking up?, with toy?, with books?, etc.

11. Please make a list of the vowels, consonants or other sounds which your child has been making this week:

12. Please make a list of the words which your child has been making this week:

13. Please make a list of some of the phrases and sentences which your child has been making this week:

VIII. OTHER QUESTIONS

If there are questions which you have had about your child's feeding, breathing, sound play, speech, or understanding, please list them here so that we can be sure to discuss them with you.

APPENDIX C

MATERIALS NEEDED FOR THE PRE-SPEECH ASSESSMENT SCALE

## MATERIALS NEEDED FOR THE PRE-SPEECH ASSESSMENT SCALE

1. Bottle with liquid (if the child drinks from the bottle).
2. Cup with one-ounce markings, and liquid.
3. Spoon.
4. Pureed foods (strained fruit or pudding).
5. Solid lumpy foods.
6. Soft cookie (animal cracker, graham cracker, butter cookie ).
7. Hard cookie (Gerber firm baby cookie, large pretzel, firm or stale Oreo cookie).
8. Raisins.
9. Chewy meat.
10. Stopwatch or watch with a second hand.
11. Pictures or books containing pictures of the following animals: dog, puppy, cat, kitten, cow, lamb, goat, duck, chick, pony, pig, bunny, owl, mouse.
12. Small models of car, train, plane, boat, fire engine or emergency vehicle.
13. Pre-Speech Assessment and Summary of Scores.
14. Parent Questionnaire.
15. Pre-Speech Assessment Scale Manual.
16. Graph Sheet for the Pre-Speech Assessment Scale.
17. Colored felt-tipped pens (black, red).
18. Tape recorder.

## BOOKS CONTAINING ANIMAL PICTURES

The following books have been reviewed for suitability and variety of pictures to provide stimuli for eliciting phonation and sound production in children above the age of 18 months. The selection of materials by the examiner will depend largely upon the types and numbers of children who are to use the books. Books with cardboard pages are more durable than those made of paper; cloth books are durable and easily washable but may be difficult for children needing stability or resistance in turning pages. Sturdily constructed books may have illustrations which older children consider too babyish or illustrations which do not provide easy elicitation of descriptive or action phrases. Therefore, a brief description of each book has been given with no firm recommendations for one or the other. The books are listed in a general order of preference according to a criteria of clarity of illustrations and variety of different animals pictured.

1. I Hear (Lucille Ogle and Tina Thoburn) published by McGraw-Hill
   -excellent, clear pictures of nearly all animals and environmental sounds needed for the Pre-Speech Assessment Scale.
   -book organization emphasizes listening skills, and sounds heard in different environments; i.e., at home, in the city, at the zoo, on the farm, in the woods, at the seashore, sounds made by children.
   -some pictures give opportunities for simple phrases and sentences.

2. Animal Sounds (Golden Press) published by Western Publishing Co.
   -cardboard pages.
   -excellent, clear pictures of nearly all animals needed for the PSAS.
   -animal pictures include: dog, cat, cow, duck, mouse, pig, chick, pony, lamb, goat, owl, bird, goose, rooster, hen, frog, bee, donkey, turkey, sheep.

3. Talkabout Animals (W. Murray) published by Ladybird Books Ltd. (England)
   -pictures of animals in many settings to stimulate speech.
   -excellent variation of animals and action pictures to stimulate phrases and early sentences.
   -animal pictures include: sheep, lamb, chicks, duck, horse, pony, cow, bird, cat, kitty, pig, dog, puppy, bunny, lion, owl, mouse, many woodland and zoo animals.
   -many mother and baby animal pictures.

4. Baby Animals (Harry McNauget) published by Random House
   -cardboard pages.
   -mothers and babies both pictured.
   -animal pictures include: bunny, pig, cat, kitty, cow, duck, goat, chick.

5. Sleepy Time (Gyo Fujikawa) published by Grosset and Dunlop
   -excellent for stimulating 2-3 word phrases involving children and animals; i.e., "night-night..."
   -cardboard pages.
   -animals pictured sleeping include: bunny, horse, cow, sheep, owl, puppy, kitty.

6. My Big Golden Counting Book (Lillian Moore) published by Golden Press
   -pictures of different numbers of animals for counting purposes.
   -mostly baby animals pictured.
   -good for stimulating 2-word phrases such as "one puppy, four kitties."
   -animal pictures include: puppy, lamb, pony, horse, kitty, bunny, chicks, duck, fish, geese, squirrel.

7. The Cow Says Moo (Random House Cloth Book) published by Random House
   -simple cloth book with clear pictures.
   -animal pictures include: cow, sheep, pig, goose, duck, chick, rooster, dog, cat.

8. Baby Animals (John Parr. Random House Cloth Book) published by Random House
   -simple cloth book with clear pictures.
   -animal pictures include: cat, kitten, chick, duck, dog, puppy, bear.

9. Discover Animal Friends - A Sticker Book (A Whitman Book) published by Western Publishing Co.
   -many excellent animal stickers to cut out.
   -could be mounted on cardboard or laminated for simplicity and durability.
   -includes both mother and baby animals.
   -animal pictures include: dog, puppy, chick, rooster, cow, cat, kitty, sheep, lamb, turkey, duck, horse, pony, pig, bunny, goat, goose.

10. Baby Farm Animals (Garth Williams) published by Golden Press
    -baby animals only.
    -animal pictures include: kitty, bunny, donkey, duck, chick, pig, cow, lamb, goat, goose, pony.

11. My Day on the Farm (Chiyoko Nakatani) published by Thomas Y. Crowell Co.
-pictures of a small boy visiting a farm.
-animals pictured in various activities such as eating and sleeping.
-good for eliciting phrases such as "night-night cow," "pig eat," etc.
-animal pictures include: cow, dog, sheep, lamb, goat.

12. The Little Goat
The Little Duck
The Little Lamb (Random House Pictureback Series) published by Random House
-excellent series of paperbacks with photographs and a simple story.
-good for greater child involvement to facilitate repeated productions of a small series of words and sounds and early phrases and sentences.

13. Puppies (Jan Pfloog)
Kittens (Jan Pfloog) published by Random House
-cardboard pages.
-many pictures of different puppies and kittens involved in various activities.
-good for greater child involvement to facilitate repeated productions of a small series of words and sounds.
-good complimentary volume to the book, Baby Animals, published in the same series by Random House.

14. Whose Baby? (Pre-School Golden Book) published by Golden Press
-cardboard pages, spiral binding.
-mother and baby animals.
-flaps hide the animals. Good for interest, suspense, etc. in spontaneous naming.
-animal pictures include dog, puppy, pig, bunny, cat, kitten, mouse, spider, fish, human baby.

15. Baby Animals (Tien) published by Platt and Munk
-baby animals with their mothers but the full adult animal is not pictured.
-animal pictures include puppy, goat, kitten, bunny, lamb, cow, bear, pig, duck, monkey, seal, penguin, elephant, kangaroo, lion cub.

16. Our Animal Friends at Maple Hill Farm (Alice and Martin Provenaen) published by Random House
-detailed book about aspects of living with animals on a farm.
-may be very appropriate for older children.
-animal pictures are slightly stylized and would not be good for children with perceptual or major cognitive problems.
-animal pictures include: cat, dog, pig, horse, chickens, rooster, goose, sheep, lamb, goat, cow, bunny, mouse, bird, various woodland animals.

17. My Animal Friends (Perma-Life Book) published by Platt and Munk
-plastic coated flexible pages which are very durable.
-animal pictures include: dog, pig, horse, pony, cow, calf, cat, kitten, sheep, squirrel.

18. My Play Book (Perma-Life Book) published by Platt and Munk
-plastic coated flexible pages which are very durable.
-pictures of simple objects include: apple, duck, phone, chicken, bed, pig, shoes, fire engine, goat, mittens, horse, truck, tug boat, t.v., turkey.

19. Baby's First Toys (Perma-Life Book) published by Platt and Munk
-plastic coated flexible pages which are very durable.
-single large picture to a page of simple objects including: blocks, balloon, doll, ball, truck, boat.

APPENDIX D

GUIDING QUESTIONS FOR THE PRE-SPEECH ASSESSMENT

## GUIDING QUESTIONS FOR THE PRE-SPEECH ASSESSMENT

Developed and Used with Permission of:

Suzanne Evans Morris, Ph.D.
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Madison, Wisconsin 53705

The key to successful evaluation of communicative function and the development of an appropriate treatment program lies not in the answers but in the questions which guide one's observations.

The following set of questions was designed to guide the pre-speech examiner toward the types of observations which should be made in gaining a full and integrated view of the child's pre-speech skills.

Sections providing information to integrate pre-speech specifics into the broader frameworks of physical and sensory function and the child's use of general communication skills are also provided.

The question sections are keyed to the Pre-Speech Assessment Form. They may be used as a guide to observation and information gathering as the examiner gains spontaneous abilities to make these observations. They also provide the key informational areas which are used for scoring with the Pre-Speech Assessment Scale.

The examiner is not expected to obtain detailed answers to each question. Initial focus should be on the key question which is underlined in each section. A general impression of normal or abnormal function and level of function or dysfunction should be obtained. Specific details providing additional information may be filled in in answer to the subquestions once the broader picture has been obtained.

## GENERAL POSTURAL TONE

1. What is the basic postural tone at rest?
   a. Hypertonic? Hypotonic? Fluctuating?
   b. How is it affected by moving the child? By her active movement? By sensory stimulation?
   c. What happens to tone when she tries to reach for a toy? When she tries to talk or communicate with someone?
2. Where is postural tone the most normal?
   a. Prone? Supine? Side-lying? Sitting? Standing?
   b. Does this depend upon the activity of the child or amount of stimulation?
3. Are there typical patterns of tone and movement?
   a. In the head and trunk?
   b. In the arms and shoulders?
   c. In the hips and legs?

## HEAD AND TRUNK CONTROL

1. What control does the child have of her trunk?
   a. What is control like in sitting? In standing? In walking?
   b. Is control affected by abnormal or primitive reflex patterns?
   c. Does the trunk participate in appropriate balance or equilibrium reactions?
   d. Is there trunk rotation in rolling over? In sitting?
   e. Is there appropriate lateral trunk flexion?
2. What control does the child have of her head?
   a. What is head control like in prone? In sitting? In standing? In walking? When pulled to sit from supine?
   b. Is control affected by abnormal or primitive reflex patterns?
   c. Is there head righting when tipped backward? Tipped forward? To the right side? To the left side?
   d. Does she use her head movement appropriately in rolling from prone to supine? From supine to prone? In getting independently into sitting?
   e. What happens to head control during feeding? During listening? During speech?
   f. Can she move her eyes independently of her head? Maintain eye contact with the listener? When speaking?
   g. Does the head participate in balance or equilibrium reactions?

## ARM CONTROL AND SYMMETRY

1. What control does the child have of her arms?
   a. Is there weight bearing in prone? On the forearms? On extended arms? Can she shift her weight to reach up and out with one hand? Is weight bearing affected by abnormal reflexes or head position? Can she pivot in prone? In both directions?
   b. Is there weight bearing on the arms in sitting? Forward? Sideward? Backward? Are there differences in the two sides or arms?
   c. Is there active protective extension forward? To the right side? To the left side? Backward? Differences in the two arms?
   d. Do the arms participate in equilibrium reactions?
   e. Are there associated reactions of the arms during feeding? During speech? When using one hand for gross motor play? When using one hand for fine motor activities?
2. Is the child symmetrical?
   a. Does she become asymmetrical when the head is turned? In supine? In prone? In sitting? In standing? How strong is the pattern? Is she bound by it?
   b. Are there deformities from the asymmetry?
   c. Is one side more involved than the other?

## INFLUENCE OF ABNORMAL TONE AND MOVEMENT ON THE SPEECH MECHANISM

1. What is the relationship between the child's total movement patterns and her speech mechanism?
   a. How is the jaw influenced by abnormal tone in the rest of the body? By abnormal patterns of asymmetry? Extension? Flexion?
   b. How are the lips influenced by abnormal tone in the rest of the body? By abnormal patterns of asymmetry? Extension? Flexion?
   c. How is the tongue influenced by abnormal tone in the rest of the body? By abnormal patterns of asymmetry? Extension? Flexion?
   d. How are the cheeks influenced by abnormal patterns of asymmetry? Extension? Flexion?
   e. How is the respiratory system influenced by abnormal tone in the rest of the body? By abnormal patterns of asymmetry? Extension? Flexion?

RESPONSE TO SENSORY STIMULATION

1. What is the child's response to auditory stimulation?

   a. Has his hearing been tested?
   b. Can he tolerate loud noises? High pitched noises? Sudden introduction of sound? Music? Machinery noises?

2. What is his response to visual stimulation?

   a. Has his vision been tested?
   b. How does he respond to familiar toys or objects? To pictures? To food?
   c. Does he become more tense if objects are moved toward him and he is encouraged to become physically involved?

3. What is his response to vestibular stimulation?

   a. What happens to postural tone when he is moved by someone else?
   b. When he actively moves himself?
   c. With slow movement? Rapid movement? Sudden movement?
   d. Does he become calmer or better organized with slow vestibular stimulation of rocking, swinging, etc.?

RESPONSE TO SENSORY STIMULATION

1. What is his response to new tastes?

   a. Special likes or dislikes?
   b. Easy or difficult adaptations when new tastes are introduced?

2. What is his response to different odors?

   a. Special likes or dislikes?
   b. Does he want to smell everything?
   c. Does he constantly have nasal congestion?

3. What is his response to social and emotional stimulation?

   a. Does he over-respond with excessive laughter, crying, or other types of emotional lability?
   b. Does it trigger abnormal responses of the body? Increase hypertonicity? Trigger abnormal reflexes in the mouth; i.e., Jaw thrusting? Tongue thrusting?
   c. How does he react to praise? To scolding? To general criticism?

RESPONSE TO SENSORY STIMULATION

1. What is his response to tactile stimulation?

   a. What is his response to touch on the trunk? Arms? Legs? Hands? Feet? Firm touch? Light touch? Galant response?
   b. Does he like touch on the body? Does he like to be held and cuddled?
   c. What is his response to touch on the face? Around the lips? Firm touch? Light touch? Rooting reaction?
   d. Does he like to have his face touched?
   e. What is his response to touch on his teeth and gums? Tonic bite? Phasic bite? Suckling?
   f. What is his response to touch on the tongue? Normal gag reflex? Hyperactive gag? Hypo-active gag? Absent gag?
   g. What is his response to touch on the anterior portion of the hard palate?
   h. Does he enjoy oral stimulation? Does he seek it out? Mouth things? Suck his hands?
   i. Does tactile stimulation to the face, lips, or in the mouth trigger abnormal oral or body reflexes?
   j. Do problems with oral hypersensitivity interfere with daily care activities? Tooth brushing? Feeding?
   k. What is his ability to provide oral self-stimulation? Does he get hands to mouth? Suck hands or fingers? Wipe his face? Bring toys to the mouth independently? Finger feed himself? Spoon feed himself?
   l. Does hand-to-mouth activity with toys or self-feeding increase abnormal patterns in the mouth?

STRUCTURAL DEVIATIONS OR DEFORMITIES

1. Does the child have any structural deviations or fixed deformities which must be considered in treatment?

   a. Are there deformities or deviations of the oral mechanism? i.e., Mandible? Maxilla? Teeth? Tongue? Lips? Jaw? Palate? Tonsils and adenoids?
   b. Are there deformities or deviations of the larynx?
   c. Are there deformities or deviations of the skeleton? Spine? Rib cage? Head? Arms or legs? Feet or hands? Is there scoliosis? To which side?
   d. Are there contractures? At the hip? Knees? Elbows? Fingers? Are they fixed or is there still some mobility?
   e. Are the hips subluxed or dislocated?
   f. Gastro-intestinal anomalies?

2. Has there been any surgical correction of deformities?

   a. What? When? Where? What results?
   b. Is any new surgery being proposed?

3. Has there been any bracing to correct deformities?

   a. What? When? Where? What results?
   b. Is any new bracing being proposed?

## PHYSICAL USE OF HEAD, TRUNK, AND ARMS FOR COMMUNICATION

1. How does the child use or attempt to use her head, trunk and arms to communicate?
   a. Does she use her "c.p. behaviors" to communicate? i.e., thrusting? stiffening?
   b. Does she turn her head to find what she wants?
   c. Does she use her trunk to come forward or seek what she wants? i.e., person? food? toys? to indicate interest?
   d. Does she use simple gestures? Use her arms or hands for pointing? Use signing? finger spelling?
2. What limitations in head control interfere with communication?
   a. Strong patterns of extension or flexion?
   b. Difficulties keeping the head in midline or turning it to one side?
3. What limitations in trunk control interfere with communication?
   a. Strong patterns of extension or flexion?
   b. Asymmetry? Lateral flexion?
   c. Poor stability?
4. What limitations in arm and hand control interfere with communication?
   a. Shoulder girdle retraction? protraction?
   b. Total patterns of flexion? extension?
   c. Strong pronation patterns?
   d. Poor weight bearing?

## PHYSICAL USE OF THE FACE AND EYES FOR COMMUNICATION

1. How does the child use or attempt to use her eyes and face for communication?
   a. Does she use her "c.p. behaviors" to communicate? i.e., jaw thrust? lip retraction? tongue thrust?
   b. Does she use her eyes to find what she wants? to eye-point? to sustain eye contact with a listener/speaker?
   c. Does she use facial expression to communicate? feeling? desires? feedback to listener?
2. What limitations in eye control interfere with communication?
   a. Can she move her eyes independently from her head? upward? downward? to side?
   b. Can she sustain eye contact?
   c. Can she track the eyes together?
   d. Problems with visual acuity? perception?
   e. Can she move her eyes and hands together?
3. What limitations in facial control interfere with communication?
   a. What is the muscle tone in the face? stiff? flabby? variable?
   b. Is there lack of sublety or variety of expression?
4. What limitations in jaw and lip control interfere with communication?
   a. Jaw thrust? frequency? under what physical or social conditions?
   b. Lip retraction? frequency? under what physical or social conditions?
   c. Social responses to jaw and lip patterns?

## COMMUNICATION AT MEALTIMES

1. How does she communicate hunger?
   a. Does parent know she is hungry? special cry? mouth movements? speech? pointing? going to food?
2. How does she communicate fullness?
   a. Does parent know when she has had enough to eat? special cry or sound? mouth movements? pushing away? speech?
3. How does she communicate food preferences?
   a. Does she have preferences? likes or dislikes?
   b. How does she let others know? pointing? speech? fussing? facial expression? sounds?
4. How does the child interact with the feeder?
   a. Does she initiate eye contact? mouth opening for food? touch? vocalization? smiling?
   b. How does she respond to the feeder? eye contact? vocalization? smiling? withdrawal? passivity? abnormal movements?
5. How does the feeder interact with the child?
   a. Does she initiate eye contact? facial expression? vocalization? touch?
   b. How much physical and emotional tension does the feeder experience?
   c. How does the feeder respond to the child? eye contact? vocalization? facial expression? imitation? ignoring? anger?

## USE OF AUGMENTATIVE COMMUNICATION SYSTEMS

1. What needs does the child have for a supplemental non-vocal system?
   a. Is the cognitive or linguistic level now higher than her current speaking ability?
   b. Is there frustration from lack of effective communication?
   c. Does she already try to communicate non-vocally?
   d. Does she currently have a non-vocal system? signing? communication board? How effectively does is it used?
2. What are her cognitive and linguistic abilities for a formal non-vocal system?
   a. Does she understand photographs? other pictures? symbols?
   b. Does she read? at what level?
   c. Does she spell? at what level?
3. Does she have a consistent normal movement which which could be used for indicating?
   a. Direct pointing? Hands? Eyes?
   b. Controlled movement to operate a switch?
   c. Vocal response?

## LENGTH OF TIME REQUIRED TO EAT A MEAL

1. How many minutes does an average meal require?

   a. Which is the largest meal?
   b. Who feeds the child most frequently?
   c. What position is usually used for feeding?
   d. What is the typical length of time for the largest meal?
   e. How much variation in time occurs? with different feeders? with different foods? with different positions?

2. How much playing or waiting occurs during the meal?

   a. Is this play for the child's and feeder's enjoyment?
   b. Is the play or waiting a needed step in improving the child's eating ability?

3. Are there behavioral problems during feeding?

   a. What types of problems?
   b. How does the feeder handle them?
   c. What is the child's response?
   d. Does this increase the amount of time spent for mealtime?

## AMOUNT OF FOOD EATEN AT A MEAL

1. What is the approximate amount of food and liquid eaten at a meal?

   a. Which is the largest meal?
   b. Who feeds the child most frequently?
   c. What position is usually used for feeding?
   d. What is the approximate amount eaten at the largest meal? food? liquid?
   e. How much variation in amount occurs? with different feeders? with different foods? with different positions?
   f. Have there been recent increases in the amount eaten? decreases?

2. Are there behavioral problems during eating?

   a. What types of problems?
   b. How does the feeder handle them?
   c. What is the child's response?
   d. Does this affect the amount of food which the child eats?

3. What are the parent's expectations for the the amount of food eaten?

   a. Total amount consumed per meal? per day?
   b. Weight gain?
   c. Does the child meet the parent's expectations?
   d. Are the expectations unrealistic for this child?

## TYPES OF FOOD EATEN BY MOUTH

1. Is the child tube fed?

   a. How frequently? Why?
   b. Does he receive some oral feedings?

2. Are liquids thickened or semi-solids thinned?

   a. Why? How frequently?
   b. Does he receive some liquids or semi-solids which have a normal consistency?

3. What types of food are given at mealtimes?

   a. Liquids?
   b. Pureed food?
   c. Ground or junior foods?
   d. Lumpy table foods?
   e. Coarsely chopped fruits and vegetables?
   f. Meat? easily chewed? more difficult?

## POSITION IN WHICH THE CHILD IS FED

1. What position(s) does the feeder use?

   a. Supine? prone? reclining at an angle less than 45°? side-lying?
   b. Supported semi-sitting on feeder's lap? infant seat?
   c. Sitting in chair with seat and back at 90°?
   d. Amount of external trunk support required?

2. What abnormal postural tone and movement patterns occur during feeding?

   a. Do the abnormal patterns affect the oral mechanism?

3. Does the feeder make adaptations in positioning and handling?

   a. What adaptations?
   b. How effective are they?
   c. How consistently are they used?

SUCKING: LIQUIDS FROM THE BOTTLE OR BREAST

1. What is her sucking like from the bottle or breast?

   a. Can she initiate sucking easily? sustain it?
   b. Is there a tongue thrust? exaggerated tongue protrusion? jaw thrust? bite reflex? tongue retraction? how frequently?
   c. What type of nipple is used? Is the hole enlarged? Under what circumstances?
   d. Is there a normal cupped configuration of the tongue? thick or bunched? deviation to the side when nipple is inserted or removed?
   e. What is the lip control during sucking? Does she lose liquids?
   f. Is she tube fed liquids?
   g. Is her sucking slow? weak? inefficient?

SUCKING: LIQUIDS FROM THE CUP

1. What is her sucking like from the cup?

   a. Does she actually suck or suckle from the cup? Is liquid just poured into the mouth?
   b. Is there a tongue thrust? exaggerated tongue protrusion? jaw thrust? biting or mouthing of the cup? lip retraction? purse-string action of lips? tongue retraction? muscle weakness? How frequently?
   c. What type of cup is used?
   d. Is there a normal cupped configuration of the tongue? Is it thick or bunched? deviation to the side?
   e. What is the lip control during sucking?
   f. Does she use a forward-backward suckling motion of the tongue? Is there a more mature true suck pattern?
   g. What is jaw movement like during drinking? Up and down? Stabilized by biting on the cup? Internal jaw control?

SWALLOWING: LIQUIDS

1. What is her swallowing of liquids like?

   a. Is she tube fed? Has she been tube fed in the past?
   b. Are there swallowing movements when liquids enter the mouth?
   c. Does the child swallow with her head in extension? How frequently? Why?
   d. Is swallowing of liquids considered poor? Is there frequent coughing or choking? Nasal regurgitation? Greater difficulties with thin or other types of liquids? Slow swallowing? Little or no upward movement of the larynx during swallowing? Tongue or lip retraction which interfere with swallowing?
   e. Is there a tongue thrust at the point of swallowing? exaggerated tongue protrusion?
   f. Is there an easy protrusion or extension-retraction movement during the swallow?
   g. Is there any tongue-tip elevation? Does the tongue move independently from the mandible as it elevates? All the time or intermittently?
   h. What is lip control during swallowing? Is there loss of liquid? during drinking? when cup is removed from the mouth? are the lips open?

COORDINATION OF SUCK, SWALLOW, BREATHING

1. How well does the child coordinate sucking, swallowing, and breathing?

   a. Is there respiratory distress during feeding? Are the child's respiratory difficulties considered to be medically life-endangering? Has the child had instances of aspiration pneumonia?
   b. How many suck-swallow sequences can the child take from the bottle or breast?
   c. Is the sequencing of suck-swallow-breathing interfered with by jaw or tongue thrusting?
   d. Does the child show any of the following respiratory problems during feeding? Clavicular breathing? retraction at the jugular notch of the sternum? retraction between the ribs? nasal flaring?
   e. Can the child inhibit breathing while she is sucking and swallowing? Does her inability to do so cause respiratory distress?
   f. How many suck-swallow sequences can the child take from the cup?
   g. Does she cough and choke with cup drinking?
   h. Can she drink at least an ounce of liquid from the cup without major pauses?

SUCKING: PUREED FOODS FROM THE SPOON

1. What is his sucking like from the spoon?

   a. Does the tongue make suckling or sucking motions when pureed food is placed in the mouth? Are these well sustained? slow?
   b. Is there a jaw thrust? jaw clenching? tonic bite reflex? phasic bite reflex? chewing or uncoordinated mouthing? How frequently?
   c. What type of spoon is used?
   d. Is there a normal cupped configuration of the tongue? Is it thick or bunched? deviation to the side?
   e. What is the action of the tongue? suckling? sucking? Does it remain quiet in anticipation until food enters the mouth?
   f. Is the upper lip used to remove food from the spoon?
   g. Does the lower lip draw in?
   h. Are the upper gums or upper incisors used to clean the lower lip? Does the tongue help clean the lips?

SWALLOWING: SEMI-SOLIDS

1. What is his swallowing of semi-solids like?

   a. How frequently are semi-solids given? Are they supplemented with tube feedings?
   b. Are there swallowing movements when semi-solids enter the mouth?
   c. Does the child swallow with his head in extension? How frequently? Why?
   d. Is swallowing of semi-solids considered poor? frequent coughing or choking? nasal regurgitation? Very slow swallowing or difficulties moving the food backward into the pharynx? little or no upward movement of the larynx during swallowing? lip or tongue retraction which interfere with swallowing?
   e. Is there a tongue thrust at the point of swallowing?
   f. Can the child swallow voluntarily and without an init'ating suck or suckle?
   g. How frequently does the child gag, choke, cough, vomit or spit semi-solid foods?
   h. Is there an easy protrusion or extension-retraction movement during the swallow?
   i. Is there any tongue-tip elevation? Does the tongue move independently from the mandible as it elevates? All the time or intermittently?
   j. What is the lip control during swallowing? Is there loss of food or saliva? Is there good lip closure?

SWALLOWING: SOLIDS

1. What is his swallowing of solids like?

   a. How frequently are solids given?
   b. Are there swallowing movements when solids are placed in the mouth?
   c. Does the child swallow with his head in extension? How frequently? Why?
   d. Is swallowing of solids considered poor or difficult? nasal regurgitation? very slow swallowing or difficulty moving the food into the pharynx? little or no upward movement of the larynx during swallowing? tongue or lip retraction interfering with swallowing? difficulties forming a bolus?
   e. Is there a tongue thrust at the point of swallow? exaggerated tongue protrusion?
   f. Can the child swallow solids voluntarily or only when sucking or suckling precedes the swallow?
   g. How frequently does the child gag, choke, cough, vomit or spit solid foods?
   h. Is there an easy protrusion or extension-retraction movement during the swallow?
   i. Is there any tongue-tip elevation? Does the tongue move independently from the mandible as it elevates? all the time or intermittently?
   j. What is the lip control during swallowing of solids? Is there loss of food or saliva? Is there good lip closure?

CONTROL OF DROOLING

1. What is the child's control of drooling?

   a. Does he drool? How frequently?
   b. Is drooling related to the physical position of the child? supine? prone? sitting? standing?
   c. Does he drool when engaged in gross motor activities? rolling? crawling? sitting up? cruising? walking?
   d. Does he drool while using the hands for dressing? feeding? play? drawing? during early speech attempts?
   e. Is he cutting teeth? Is drooling worse during cutting teeth than at other times?

## JAW MOVEMENT IN BITING

1. What is her jaw movement like in biting?

   a. Is biting interfered with by a jaw thrust? tongue thrust? tonic bite reflex? jaw clenching? excessive jaw retraction? weakness? How frequently?
   b. Are there structural problems of malocclusions which interfere with biting?
   c. Is there a jaw deviation to either side when the child bites?
   d. Does she just suck when given something to bite?
   e. Does she use a primitive phasic bite pattern?
   f. Does she hold the food with her teeth but not bite through?
   g. Is there a sustained, controlled bite? through soft foods? through hard foods?
   h. Is there overflow or associated movements in the head, arms, or legs during biting?
   i. Can she keep her head in midline when food is presented on the side for biting?
   j. Can she grade the opening of the jaw appropriately for foods of different thicknesses?

## JAW MOVEMENT IN CHEWING

1. What is her jaw movement like for chewing?

   a. Does she chew? Does she just suck everything?
   b. Is chewing interfered with by a jaw thrust? excessive jaw retraction? tonic bite reflex? jaw clenching? tooth grinding? tremors? weakness?
   c. Is there a lateral or forward deviation of the jaw during chewing?
   d. Is there a difference in her ability to chew softer versus firmer foods?
   e. What is jaw movement like? primitive phasic bite-and-release pattern? variable rhythm? diagonal-rotary pattern? circular-rotary pattern?

## TONGUE MOVEMENT IN CHEWING

1. What is tongue movement like for chewing?

   a. Does she chew? Just suck everything? How consistently?
   b. Is chewing interfered with by a tongue thrust? by tongue retraction? hypersensitivity?
   c. Does the child show early munching patterns?
   d. Is there tongue lateralization when food is placed on the side? Is this mixed with a suckling pattern?
   e. Is there tongue lateralization when food is placed in the center of the tongue? transfers to the right? transfers to the left?
   f. When food is placed between the biting surfaces of the molars, does the tongue transfer it to the other side? from right to left? from left to right?
   g. Is there speed and precision in tongue movement?

## LIP MOVEMENT IN CHEWING

1. What is lip movement like for chewing?

   a. Does she chew? Just suck everything? How consistently?
   b. Is chewing interfered with by lip retraction? by lip purse-string action? tremor? weakness? How frequently?
   c. Do the lips move primarily with the jaw? Independently of the jaw? upper lip? lower lip?
   d. Do the cheeks assist in holding and moving food?
   e. Do the lips draw in to assist in removing food?
   f. Does the child use her incisors or gums to clean food from the lips as they are drawn inward?
   g. Is there loss of food or saliva while chewing?
   h. Can she chew with the mouth closed?

## SUMMARY OF JAW MOVEMENT DURING FEEDING

1. Do abnormal patterns of jaw movement interfere with feeding?
   a. Which patterns? thrust? retraction? protrusion? clenching? tonic bite? tooth grinding? deviations? tremors?
   b. How strong are the patterns?
   c. How frequently do they occur?
   d. Under what conditions do they occur?
2. What degree of jaw stability has been achieved?
   a. In opening the jaw for the spoon?
   b. In cup drinking? (i.e., unstabilized? external stabilization? internal stabilization?)
   c. In biting? swallowing?
3. What control of jaw movement occurs for opening and closure?
   a. Range and direction of movement: appropriateness of amount of up-down movement during bottle or breast feeding? cup drinking? spoon feeding? biting? chewing?
   b. Timing and rhythm of movement: how appropriate is the speed? how regular? how rhythmical? during sucking? chewing?
4. How well is the child able to grade movement of the jaw or make small changes smoothly?
   a. In opening the mouth for different sizes and amounts of food?
   b. In using appropriate amounts of force in biting?

## SUMMARY OF TONGUE MOVEMENT DURING FEEDING

1. Do abnormal patterns of the tongue interfere with feeding?
   a. Which patterns? thrust? exaggerated protrusion? retraction? strong hypersensitivity? weakness?
   b. How strong are the patterns?
   c. How frequently do they occur?
   d. Under what conditions do they occur?
2. What degree of elevated tongue-tip has been achieved?
   a. In swallowing?
   b. In lateral transfer of food?
   c. In cleaning the lips?
   d. Area of contact?
3. What control of tongue movement does the child have?
   a. Range and direction of movement: extension-retraction? up-down? lateral? across midline?
   b. Timing and precision of movement: how appropriate is the speed? precision in lateral transfer? in transfer across midline? in cleaning the lips?
4. What degree of separation of tongue movement from jaw movement is present?
   a. Does jaw separate from an elevated tongue in swallow?
   b. Front of tongue elevation in side-to-side transfers across midline?
   c. In cleaning the upper lip? buccal cavity?
   d. Lateral tongue movement?

## SUMMARY OF LIP MOVEMENT DURING FEEDING

1. Do abnormal patterns of the lips interfere with feeding?
   a. Which patterns? retraction? purse-string? weakness? tremors?
   b. How strong are the patterns?
   c. How frequently do they occur?
   d. Under what conditions do they occur?
2. What degree of lip closure has been achieved?
   a. With the bottle or breast? with cup?
   b. With the spoon? during chewing?
3. What control of lip movement does the child have?
   a. Range and direction of movement: upper lip? lower lip? coordinated with cheek activity? cleaning?
   b. Timing and precision of movement: how appropriate is speed? precision of upper lip in cleaning spoon?
   c. Force of movement: degree of lip pressure against the spoon in removing food?
4. What degree of separation of lip movement from jaw movement is present?
   a. Is lip closure maintained during bottle drinking? cup drinking? chewing?
   b. Does upper lip come forward and down to clean the spoon?
   c. Does the lower lip draw in for cleaning?

## RESPIRATION-PHONATION

1. What type of respiratory pump does the child have available to support speech?
   a. What is the tonus of the breathing musculature?
   b. Is there flexibility of the spine?
   c. Is depth of breathing shallow?
   d. Is the breathing rhythm regular? periodic? irregular?
   e. What type of respiratory movement predominates? reverse breathing? clavicular breathing? abdominal breathing? thoracic breathing? How variable is this with the position of the child?
   f. Is there rib flaring? indentation or retraction at the jugular notch of the sternum? intercostal retraction?
   g. What is the respiratory rate? Is it excessively rapid? Excessively slow?
   h. Does he breathe primarily through the nose? Through the mouth?

## EASE OF INITIATION OF PHONATION

1. How well can the child initiate phonation?

   a. Are there difficulties during crying? laughing? squealing?
   b. Are there difficulties during the production of vowels? consonant-vowel syllables (CV)? sequenced consonant-vowel combinations (CVCV)?
   c. Are there difficulties during single words? phrases and sentences?
   d. What type of initiating difficulty? open laryngeal blocs? closed laryngeal blocs? voicing with hard glottal attacks with head extension or jaw thrusting?
   e. Do laryngeal blocs cut off or reduce the duration of phonation?

## DURATION OF PHONATION

1. Can she sustain phonation long enough to support speech?

   a. What is the longest duration of cry which occurs more than once? less than 1 second? 1-2 seconds? more than 2 seconds?
   b. What is the longest duration of vowel production which occurs more than once? duration of single consonant-vowel syllables (CV)? duration of sequenced consonant-vowel combinations (CVCV)?
   c. Does she become stiff or show abnormal patterns of movement during phonation? does it become worse as duration of phonation increases? in vowels? CV syllables? CVCV combinations? words? phrases and sentences? How frequently?
   d. Does she increase tension in the larynx as a means of controlling duration?
   e. Is duration long enough to support 1-2 syllable words? 2-3 word combinations? Does phonation die out at the end of the word or phrase?
   f. Does the child's emotional reaction influence the duration of phonation? How?

## LOUDNESS OF PHONATION

1. Does she have adequate loudness and variability of loudness to support speech?

   a. Is there adequate loudness during crying? Is the cry weak? quiet? low in volume? difficult to hear from another room?
   b. Is there adequate loudness during production of vowels? consonant-vowel syllables (CV)? sequenced consonant-vowel combinations (CVCV)? Is the voice weak? quiet? low in volume?
   c. Does she become stiff or show abnormal patterns of movement during phonation? Does this become worse as loudness increases? In vowels? CV syllables? CVCV combinations? words? phrases and sentences? How frequently?
   d. Does she increase tension in the larynx as a means of controlling loudness?
   e. Is loudness appropriate for words? for phrases and sentences?
   f. Is there appropriate variability of loudness levels? appropriate use of loudness in stress patterns?
   g. Does the child's emotional reaction influence the loudness of phonation? How?

## PITCH AND INTONATION PATTERNS

1. Does she have an appropriate pitch level to support speech?

   a. Is the pitch level appropriate? too high? too low? in crying? vowels? CV syllables? CVCV combinations? words? phrases and sentences?
   b. Are there marked or sudden changes in pitch? pitch breaks?
   c. Are pitch problems related to male onset of adolescence?

2. Does she have intonation patterns which provide variability for speech?

   a. Are there melody patterns during crying? What type: falling? rising-falling? falling-rising?
   b. How frequently do these patterns occur?
   c. Are there melody patterns in the production of vowels? single CV syllables? CVCV combinations? rising? falling? rising-falling?
   d. Are there intonation patterns in words? in phrases and sentences?
   e. Can the child use rising and falling intonation patterns appropriately to express a statement? a question?
   f. Are intonation patterns present but limited in range? used inappropriately?

## VOICE QUALITY DURING NON-SPEECH PHONATION

1. What type of voice quality is heard during non-speech phonation?

   a. What is the voice quality like during crying? tense? hoarse? breathy? strangled? What is the frequency of abnormal quality?
   b. Is there some variability in vocal quality with different types of cry? hunger? anger? pain?
   c. What is the voice quality like with vowels? with single consonant-vowel syllables (CV)? with sequenced consonant-vowel combinations (CVCV)? What is the frequency of abnormal quality?
   d. Is the child producing some words? Does he use jargon-like fillers between the words?

## VOICE QUALITY IN EARLY SPEECH PHONATION

1. What type of voice quality is heard during early speech phonation?

   a. What is the voice quality like during production of single words with a vowel construction? words containing voiceless consonants?
   b. Is the quality hoarse? tense? breathy? strangled? How frequently does poor voice quality occur? Under what conditions?
   c. Does he produce words with both a CV and CVCV structure?
   d. What is the voice quality like during production of phrases and sentences? How frequently does normal quality occur?

## TYPE OF SPONTANEOUS SOUND PLAY

1. Is sound play present and under what conditions does it occur?

   a. Does he produce sounds with the aspect of sound play?
   b. Is there a history of infrequent sound play?
   c. Will he produce words or sentences? in imitation? on demand?
   d. Does he produce sound play when alone? for self-stimulation and/or play?
   e. Are sounds produced with toys or pictures?
   f. Does he use sound play to interact with people? to initiate communicative contact? to respond to communicative contact?

## TYPE OF SPONTANEOUS SOUND PLAY

1. What is the physical structure of the utterances the child produces in sound play?

   a. Does he use vocalization to express early feelings of satisfaction or dissatisfaction?
   b. Does he use single consonants or consonant-like sounds?
   c. Does he use vowels or vowel-like sounds? single consonant-vowel syllables (CV)?
   d. Does he use a sequence of consonant-vowel combinations? with reduplication of the same syllables? with different syllables?
   e. How many syllables does he usually sequence together?
   f. Are clear intonation and stress patterns used in longer consonant-vowel combinations?
   g. How much variability is there in sounds produced in words?

## JAW MOVEMENT DURING PHONATION

1. What type of jaw movement is observed during sound production?

   a. Are there abnormal jaw movements? jaw thrusting? jaw clenching? strong lateral deviation? severe hypotonicity? flaccidity? jaw protrusion? mandibular facet slip?
   b. Do abnormal movements occur when phonation is initiated? throughout the vocalization? at the end of the vocalization? How frequently?
   c. Does the jaw show poor control of grading and timing of movement? exaggerations of open or closed position during phonation? adequate grading of the amount of opening to produce a wide range of vowels and consonants?
   d. Is she able to sustain jaw position during a single vowel or consonant? move smoothly from one vowel to the next or from one syllable to the next?
   e. Does the child produce three or more different vowels? Can these be produced in CV syllables? in CVCV combinations? in words?
   f. Does she produce high vowels? central vowels? low vowels? diphthongs?
   g. Is there adequate duration of phonation to support CVCV combinations?

## TONGUE MOVEMENT DURING PHONATION

1. What type of tongue movement is observed during sound production?

   a. Are there abnormal tongue movements? tongue thrusting? tongue retraction? severe hypotonicity or flaccidity? strong lateral deviations or asymmetry?
   b. Do abnormal movements occur when phonation is initiated? throughout the vocalization? at the end of the vocalization? How frequently?
   c. Does the tongue show poor control of movement and variability during phonation? quivering or tremor? somewhat passive? unable to remain in a stable position? exaggerated amounts of protrusion? tendency toward backward movement?
   d. Is the tongue held too far back in the mouth increasing the perception of nasality?
   e. Can she produce at least two different tongue configurations for vowels?
   f. Can she produce consonants with the front of the tongue? back of the tongue? fricatives?
   g. Can she produce these vowels and consonants in CV syllables? CVCV combinations? vowels?
   h. Is there adequate duration of phonation to support CVCV combinations?

## LIP MOVEMENT DURING PHONATION

1. What type of lip movement is observed during sound production?

   a. Are there abnormal lip movements? lip retraction? purse-string action? severe hypotonicity? flaccidity?
   b. Do abnormal movements occur when phonation is initiated? throughout the vocalization? at the end of the vocalization? How frequently?
   c. Do the lips show poor control of movement or reduced variability of position during phonation? quivering movement or tremor? random type of involuntary movement or facial grimacing? passivity? inability to hold a stable position for a vowel or consonant?
   d. Can the child produce the following movements during phonation: lip spreading? lip rounding? bilabial lip contact and release? labio-dental contact with fricative production?
   e. Is the amount of pressure contact, timing or amounts of rounding or spreading perceptually correct?
   f. Does she produce these movements in vowels? CV syllables? CVCV combinations? words?
   g. Is there adequate duration of phonation to support CVCV combinations?

## VELOPHARYNGEAL MOVEMENT DURING PHONATION

1. What type of velopharyngeal function is observed during sound production?

   a. Is there abnormal velopharyngeal function? nasal emission of air? snorting? other indications of poor velopharyngeal function?
   b. Does the abnormal function occur when phonation is initiated? throughout vocalization? at the end of the vocalization? How frequently?
   c. Does the velopharynx show very little control of position or movement? inappropriate alternations between nasal and oral production? nasalization of vowel or consonant at end of a word? oral consonant preceded by its nasal cognate? oral production of nasal consonant
   d. Does the child produce non-nasal vowels? oral consonants? nasal consonants?
   e. Are these produced in CV syllables? CVCV combinations? words?
   f. Can she produce both oral and nasal consonants within the same utterance?

## EVALUATION SUMMARY AND RECOMMENDATIONS

I. Summarize the basic problems with postural tone and movement patterns

II. Summarize the basic problems in the development of pre-speech skills

III. Summarize the child's assets for the development of communication skills

IV. Appropriate Treatment Goals

V. Estimate of long-term prognosis for speech? Prognosis for non-vocal communication?

APPENDIX E

PRE-SPEECH ASSESSMENT AND SUMMARY OF SCORES

# PRE-SPEECH ASSESSMENT SCALE

## PRE-SPEECH ASSESSMENT AND SUMMARY OF SCORES

Developed and Used with Permission of:
Suzanne Evans Morris, Ph.D.
202 Shepard Terrace
Madison, Wisconsin 53705

Name _____ Birthdate _____ C.A. _____

Address _____

Telephone _____ Parents' Names _____

Medical Diagnosis _____

Receptive Language Level _____

Expressive Language Level _____

Sensory Abilities/Disabilities _____

Examiner _____ Dates of Evaluation _____

### SUMMARY OF SCORES

I. FEEDING BEHAVIOR

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 1. Length of Time | 1 to 2 months | | |
| 2. Amount of Food | 1 to 7 months | | |
| 3. Types of Food | 1 to 18 months | | |
| 4. Position For Feeding | 1 to 18 months | | |
| TOTAL: | | - | + |

II. SUCKING

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 5. Bottle or Breast | 1 to 12 months | | |
| 6. Cup | 6 to +24 months | | |
| 7. Spoon | 3 to +24 months | | |
| TOTAL: | | - | + |

III. SWALLOWING

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 8. Liquids | 1 to +24 months | | |
| 9. Semi-Solids | 3 to +24 months | | |
| 10. Solids | 6 to +24 months | | |
| 11. Coordination | 1 to 15 months | | |
| 12. Drooling | 1 to 24 months | | |
| TOTAL: | | - | + |

PSAS TOTALS

Abnormal (-) _____

Normal (+) _____

IV. BITING AND CHEWING

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 13. Jaw/Biting | 5 to 24 months | | |
| 14. Jaw/Chewing | 5 to +24 months | | |
| 15. Tongue/Chewing | 6 to +24 months | | |
| 16. Lips/Chewing | 6 to 24 months | | |
| TOTAL: | | - | + |

V. RESPIRATION-PHONATION

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 17. Initiation | 1 to +24 months | | |
| 18. Duration | 1 to +24 months | | |
| 19. Loudness | 1 to +24 months | | |
| 20. Pitch and Intonation | 1 to +24 months | | |
| 21. Voice Quality: Non-Speech | 1 to 15 months | | |
| 22. Voice Quality: Early Speech | 12 to +24 months | | |
| TOTAL: | | - | + |

VI. SOUND PLAY

| | Normal Scoring Range: | Abnormal (-) | Normal (+) |
|---|---|---|---|
| 23. Type | 1 to 18 months | | |
| 24. Jaw Movement | 1 to 18 months | | |
| 25. Tongue Movement | 1 to 18 months | | |
| 26. Lip Movement | 1 to 18 months | | |
| 27. Velopharyngeal Movement | 1 to 18 months | | |
| TOTAL: | | - | + |

GENERAL POSTURAL TONE

Basic Postural Tone at Rest:

Influence of Position, Movement, and Stimulation on Postural Tone:

Typical Patterns of Tone and Movement:

Head and Trunk:

Arms and Shoulders:

Hips and Legs:

HEAD AND TRUNK CONTROL

Trunk Control:

Head Control:

ARM CONTROL AND SYMMETRY

Arm Control:

Symmetry:

INFLUENCE OF ABNORMAL TONE AND MOVEMENT ON THE SPEECH MECHANISM

Influence on the Oral-Motor System:

Influence on the Respiratory-Phonatory System:

RESPONSE TO SENSORY STIMULATION

Response to Auditory Stimulation:

Response to Visual Stimulation:

Response to Vestibular Stimulation:

RESPONSE TO SENSORY STIMULATION

Response to Taste Stimulation:

Response to Smell Stimulation:

Response to Social and Emotional Stimulation:

RESPONSE TO SENSORY STIMULATION

Response to Tactile Stimulation:

On the Body:

On the Face and Lips:

Within the Mouth:

Ability to Provide Own Oral Stimulation:

STRUCTURAL DEVIATIONS OR DEFORMITIES

Deformities or Deviations of Oral Mechanism:

Deformities or Deviations of Respiratory-Phonatory Mechanism:

Deformities or Deviation of Other Body Parts:

Orthopedic Correction Through Bracing and Surgery:

PHYSICAL USE OF HEAD, TRUNK, AND ARMS FOR COMMUNICATION

Current Use or Attempted Use:

Limitations in Head Control:

Limitations in Trunk Control:

Limitations in Arm and Hand Control:

Additional Observations and Comments:

PHYSICAL USE OF THE FACE AND EYES FOR COMMUNICATION

Current Use or Attempted Use:

Limitations in Eye Control:

Limitations in Facial Control:

Limitations in Jaw and Lip Control:

Additional Observations and Comments:

COMMUNICATION AT MEALTIMES

Communicates Hunger:

Communicates Fullness:

Communicates Food Preferences:

Child's Interaction with the Feeder:

Feeder's Interaction with the Child:

Additional Observations and Comments:

USE OF AUGMENTATIVE COMMUNICATION SYSTEMS

Needs for a Supplemental Non-Vocal System:

Cognitive and Linguistic Abilities:

Physical Ability to Indicate:

Additional Observations and Comments:

#1. LENGTH OF TIME REQUIRED TO EAT A MEAL

Largest Meal:

Who Usually Feeds:

Position Usually Used:

Special Equipment Used:

Length of Time for Largest Meal:

Amount of Playing or Waiting During the Meal:

Behavioral Problems:

Additional Observations and Comments:

PSAS Scores: (-) ____; (+) ____

#2. AMOUNT OF FOOD EATEN AT A MEAL

Largest Meal:

Amount of Liquid:

Amount of Semi-Solids or Solid Food:

Variability in Amount Eaten:

Recent Changes in Amount:

Behavioral Problems:

Additional Observations and Comments:

PSAS Scores: (-) ____; (+) ____

#3. TYPES OF FOOD EATEN BY MOUTH

Tube Feeding:

Thickening or Thinning Liquids or Semi-Solids:

Liquids:

Pureed Food:

Ground or Jr. Foods, Lumpy Table Foods:

Coarsely Chopped Fruits and Vegetables:

Meat:

Additional Observations:

PSAS Scores: (-) ___; (+) ___

#4. POSITION IN WHICH THE CHILD IS FED

Abnormal Patterns of Tone and Movement in Feeding:

Adaptations in Positioning and Handling:

Effectiveness of Adaptations in Reducing Problem in Oral Area and Throughout the Body:

Position(s) Used:

Amount of External Support Required:

Additional Observations:

PSAS Scores: (-) ___; (+) ___

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#5. SUCKING: LIQUIDS FROM THE BOTTLE OR BREAST

Initiation, Strength and Efficiency:

Jaw Activity:

Lip Activity:

Tongue Activity:

Control of Liquid Loss:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#6. SUCKING: LIQUIDS FROM THE CUP

Jaw Activity:

Lip Activity:

Tongue Activity:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#8. SWALLOWING: LIQUIDS

Observation of: bottle/breast ____ cup ____

Head Position:

Specific Swallowing Difficulties:

Jaw Activity:

Tongue Activity:

Lip Activity:

Control of Liquid Loss:

Coughing or Choking:

Additional Observations and Comments:

PSAS Scores: (-) ____; (+) ____

#11. COORDINATION OF SUCK, SWALLOW, BREATHING

Observation of: bottle/breast ____ cup ____

Respiratory Distress or Incoordination:

Suck-Swallow Sequencing:

Coughing or Choking:

Additional Observations and Comments:

PSAS Scores: (-) ____; (+) ____

#7. SUCKING: PUREED FOODS FROM THE SPOON

Jaw Activity:

Lip and Cheek Activity

Gum and Teeth Activity

Tongue Activity:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#9. SWALLOWING: SEMI-SOLIDS

Food Used For Observation:

Head Position:

Specific Swallowing Difficulties:

Jaw Activity:

Tongue Activity:

Lip Activity:

Control of Food and Saliva Loss:

Coughing, Choking, Gagging:

Additional Observations and Comments:

PSAS Scores: (-)___; (+) ___

#10. SWALLOWING: SOLIDS

Food Used For Observation:

Head Position:

Specific Swallowing Difficulties:

Jaw Activity:

Tongue Activity:

Lip Activity:

Control of Food and Saliva Loss:

Coughing, Choking, Gagging:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#12. CONTROL OF DROOLING

Swallowing Movements Observed:

Control in Supine:

Control in Prone:

Control in Sitting:

Control in Gross Motor Movement Sequences:
(i.e., rolling, creeping, cruising, walking)

Control in Fine Motor Activities:
(feeding, dressing, drawing, etc.)

Control During Speech:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#13. JAW MOVEMENT IN BITING

Food Used for Observation:

Abnormal Movement Patterns:

Control of Jaw Opening and Closing:

Biting Pattern Observed on Soft Cookie:

Biting Pattern Observed on Hard Cookie or Pretzel:

Overflow or Associated Movements:

Separation of Head and Jaw Movements:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#14. JAW MOVEMENT IN CHEWING

Food Used for Observation:

Abnormal Movement Patterns:

Stereotyped Phasic Chewing:

Non-Stereotyped Vertical Chewing:

Diagonal-Rotary Movements:

Circular-Rotary Movements:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#15. TONGUE MOVEMENT IN CHEWING

Food Used for Observation:

Abnormal Movement Patterns:

Extension-Retraction Pattern:

Munching Pattern:

Tongue Lateralization:

Food Transfer From Center to Sides:

Food Transfer From Side to Side Across Midline:

Speed and Precision:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#16. LIP MOVEMENT IN CHEWING

Food Used for Observation:

Abnormal Movement Patterns:

Drawing in of Lips and Cheeks:

Movement of Upper Lip:

Use of Gums or Incisors for Cleaning:

Chewing with Lips Closed:

Control of Food and Saliva Loss:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

SUMMARY OF JAW MOVEMENTS DURING FEEDING

Abnormal Patterns:

Jaw Stability:

Movement Control:

Grading of Movement:

Additional Observations and Comments:

SUMMARY OF TONGUE MOVEMENTS DURING FEEDING

Abnormal Patterns:

Elevated Tongue Tip:

Movement Control:

Separation of Tongue from Jaw:

Additional Observations and Comments:

SUMMARY OF LIP MOVEMENTS DURING FEEDING

Abnormal Patterns:

Lip Closure:

Movement Control:

Separation of Lips From Jaw:

Additional Observations and Comments:

RESPIRATORY PATTERNS

Tonus of Musculature:

Depth:

Rate:

Type and Area of Movement:

Regularity:

Additional Observations and Comments:

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#17. EASE OF INITIATION OF PHONATION

Manner of Initiating Phonation For:

Crying, Laughing and Squealing:

Vowels and CV or VC Syllables:

CVCV Sequences:

Single Words:

Phrases and Sentences:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#18. DURATION OF PHONATION

Bodily Tension and Movement:

Laryngeal Tension:

Duration and Adequacy of Sustained Phonation:

Crying:

Vowels and CV or VC Syllables:

CVCV Sequences:

Single Words:

Phrases and Sentences:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#19. LOUDNESS OF PHONATION

Bodily Tension and Movement:

Laryngeal Tension:

Adequacy and Variability of Loudness:

Crying:

Vowels and CV or VC Syllables:

CVCV Sequences:

Single Words:

Phrases and Sentences:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#20. PITCH AND INTONATION PATTERNS

Pitch and Intonation Patterns In:

Crying:

Vowels and CV or VC Syllables:

CVCV Sequences:

Single Words:

Phrases or Sentences:

Variability of Intonation and Pitch:

Appropriateness to Context (Questions, Greetings Declaratives, Interjections):

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#21. VOICE QUALITY DURING NON-SPEECH PHONATION

Voice Quality in Crying:

Voice Quality in Vowels:

Voice Quality in CV or VC Syllables:

Voice Quality in CVCV Combinations:

Consistency or Variability of Voice Quality:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#22. VOICE QUALITY DURING EARLY SPEECH

Voice Quality in Single Words:

with Vowels:

with Voiced Consonants:

with Voiceless Consonants:

Voice Quality with Phrases and Sentences:

Consistency or Variability of Voice Quality:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#23. TYPE OF SOUND PLAY

Presence and Use of Sound Play:

Alone, Self-Stimulation and Play:

With Toys or Pictures:

With People:

To Initiate Communicative Contact:

To Respond to Communicative Contact:

#23. TYPE OF SOUND PLAY

Frequency and Examples of Production of:

Vegetative Pleasure Sounds:

Vowels:

CV or VC Syllables:

Reduplicated CVCV Combinations ($C_1V_1C_1V_1$):

Variegated CVCV Combinations ($C_1V_1C_2V_2$), ($C_1V_1C_2V_1$) etc.:

Jargon-like use of CV and CVCV Syllables:

Single Words:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#24. JAW MOVEMENT DURING PHONATION

Abnormal Movement Patterns:

Ability to Sustain a Position for V or C:

Vowels and Vowel Sequences in Sound Play:

Vowels in Words:

Grading and Timing of Movement in VC or CVCV Transitions:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#25. TONGUE MOVEMENT DURING PHONATION

Abnormal Movement Patterns:

Speed and Precision of Movement and Control:

Type of Tongue Movement:
In Vowels:

In CV, VC and CVCV Syllables:

In Words:

Separation of Tongue and Jaw:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#26. LIP MOVEMENT DURING PHONATION

Abnormal Movement Patterns:

Timing, Pressure and Precision of Movement and Contact:

Type of Lip Movement:
In Vowels:

In Consonants:

In CVCV Syllables:

In Words:

Additional Observations and Comments:

PSAS Scores: (-) ___; (+) ___

#27. VELOPHARYNGEAL MOVEMENT DURING PHONATION

Abnormal Velopharyngeal Function:

Control and Timing of Velopharyngeal Closure and Opening:

Nasal vs. Oral Resonance for Vowels:

Nasal and Oral Consonants:
In CV or VC Syllables:

In CVCV Combinations:

In Words:

Additional Observations and Comments:

PSAS Scores (-) ___; (+) ___

## PRE-SPEECH EVALUATION SUMMARY AND RECOMMENDATIONS

I. Summarize the Basic Problems With Postural Tone and Movement Patterns:

II. Summarize the Basic Problems in the Development of Pre-Speech Skills and Communication:

III. Summarize the Child's Assets for the Development of Communication Skills:

IV. Appropriate Treatment Goals:

V. Estimate of Long-Term Prognosis for Speech - Prognosis for Non-Vocal Communication:

APPENDIX F

PRE-SPEECH GRAPH

# PRE-SPEECH ASSESSMENT SCALE

Suzanne Evans Morris, Ph.D.
January, 1982 Edition

ABNORMAL BEHAVIOR — Severe | Moderate | Mild

NORMAL DEVELOPMENTAL RANGES — Birth to 6 Months | 6 to 12 Months | 12 to 18 Months | 18 to 24 Months

PERFORMANCE EVALUATED

-9 -8 -7 -6 -5 -4 -3 -2 -1 X 0 | 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 +24

I. FEEDING BEHAVIOR
1. Length of time
2. Amount of Food
3. Types of food
4. Position for feeding

II. SUCKING
5. Liquids from bottle or breast
6. Liquids from the cup
7. Pureed foods from a spoon

III. SWALLOWING
8. Liquids
9. Semi-solids
10. Solids
11. Coordination of sucking, swallowing and breathing
12. Control of drooling

IV. BITING AND CHEWING
13. Jaw control in biting
14. Jaw control in chewing
15. Tongue movement in chewing
16. Lip movement in chewing

V. RESPIRATION-PHONATION
17. Ease of initiation
18. Duration
19. Loudness
20. Intonation patterns
21. Voice quality during non-speech phonation
22. Voice quality during early speech phonation

VI. SOUND PLAY
23. Type of sound play
24. Jaw movement
25. Tongue Movement
26. Lip Movement
27. Velopharyngeal movement

-9 -8 -7 -6 -5 -4 -3 -2 -1 X 0 | 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 +24
Severe | Moderate | Mild
ABNORMAL BEHAVIOR
PERFORMANCE EVALUATION
Birth to 6 months | 6 to 12 months | 12 to 18 months | 18 to 24 months
NORMAL DEVELOPMENTAL RANGES

Name:

Birthdate:

Evaluation #1

Dates:

C.A.:

Examiner:

Receptive Language Age:

Expressive Language Age:

Diagnosis:

Evaluation #2

Dates:

C.A.:

Examiner:

Receptive Language Age:

Expressive Language Age:

Diagnosis:

NOTE: The shaded areas on the graph represent the boundaries of the developmental range for each item.

X, 0, 1 = No accessible behavior.

# APPENDIX G

## SUMMARY OF SCORES FOR REPEATED EVALUATIONS

## PRE-SPEECH ASSESSMENT SCALE

## SUMMARY OF SCORES FOR REPEATED EVALUATIONS

Developed and Used with Permission of:
Suzanne Evans Morris, Ph.D.
202 Shepard Terrace
Madison, Wisconsin 53705

Name: _____ Birthdate: _____

Diagnosis: _____

_____

| | Evaluation #1 | Evaluation #2 | Evaluation #3 | Evaluation #4 |
|---|---|---|---|---|
| Dates: | | | | |
| C.A. | | | | |
| Examiner: | | | | |

| PERFORMANCE EVALUATED | Normal Scoring Range: | EVALUATION #1 | | EVALUATION #2 | | EVALUATION #3 | | EVALUATION #4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Abnormal (-) | Normal (+) | Abnormal (-) | Normal (+) | Abnormal (-) | Normal (+) | Abnormal (-) | Normal (+) |
| I. FEEDING BEHAVIOR | | | | | | | | | |
| 1. Length of Time | 1 to 2 months | | | | | | | | |
| 2. Amount of Food | 1 to 7 months | | | | | | | | |
| 3. Types of Food | 1 to 18 months | | | | | | | | |
| 4. Position | 1 to 18 months | | | | | | | | |
| TOTAL: | | | | | | | | | |
| II. SUCKING | | | | | | | | | |
| 5. Bottle or Breast | 1 to 12 months | | | | | | | | |
| 6. Cup | 6 to +24 months | | | | | | | | |
| 7. Spoon | 3 to +24 months | | | | | | | | |
| TOTAL: | | | | | | | | | |
| III. SWALLOWING | | | | | | | | | |
| 8. Liquids | 1 to +24 months | | | | | | | | |
| 9. Semi-Solids | 3 to +24 months | | | | | | | | |
| 10. Solids | 6 to +24 months | | | | | | | | |
| 11. Coordination | 1 to 15 months | | | | | | | | |
| 12. Drooling | 1 to 24 months | | | | | | | | |
| TOTAL: | | | | | | | | | |
| IV. BITING AND CHEWING | | | | | | | | | |
| 13. Jaw/Biting | 5 to 24 months | | | | | | | | |
| 14. Jaw/Chewing | 6 to +24 months | | | | | | | | |
| 15. Tongue/Chewing | 6 to +24 months | | | | | | | | |
| 16. Lips/Chewing | 6 to 24 months | | | | | | | | |
| TOTAL: | | | | | | | | | |

| PERFORMANCE EVALUATED | Normal Scoring Range: | EVALUATION #1 | | EVALUATION #2 | | EVALUATION #3 | | EVALUATION #4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Abnormal (-) | Normal (+) | Abnormal (-) | Normal (+) | Abnormal (-) | Normal (+) | Abnormal (-) | Normal (+) |
| V. RESPIRATION-PHONATION | | | | | | | | | |
| 17. Initiation | 1 to +24 months | | | | | | | | |
| 18. Duration | 1 to +24 months | | | | | | | | |
| 19. Loudness | 1 to +24 months | | | | | | | | |
| 20. Pitch and Intonation | 1 to +24 months | | | | | | | | |
| 21. Voice Quality/ Non-Speech | 1 to 15 months | | | | | | | | |
| 22. Voice Quality/ Early Speech | 15 to +24 months | | | | | | | | |
| TOTAL | | | | | | | | | |
| VI. SOUND PLAY | | | | | | | | | |
| 23. Type | 1 to 18 months | | | | | | | | |
| 24. Jaw Movement | 1 to 18 months | | | | | | | | |
| 25. Tongue Movement | 1 to 18 months | | | | | | | | |
| 26. Lip Movement | 1 to 18 months | | | | | | | | |
| 27. Velopharyngeal Movement | 1 to 18 months | | | | | | | | |
| TOTAL | | | | | | | | | |

TOTAL EVALUATION SUMMARY

| PERFORMANCE AREA | TOTAL POSSIBLE | | EVALUATION #1 | | EVALUATION #2 | | EVALUATION #3 | | EVALUATION #4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | - | + | - | + | - | + | - | + | - | + |
| I. FEEDING BEHAVIOR | 36 | 45 | | | | | | | | |
| II. SUCKING | 27 | 62 | | | | | | | | |
| III. SWALLOWING | 45 | 114 | | | | | | | | |
| IV. BITING AND CHEWING | 36 | 98 | | | | | | | | |
| V. RESPIRATION-PHONATION | 54 | 140 | | | | | | | | |
| VI. SOUND PLAY | 45 | 90 | | | | | | | | |
| TOTAL | -243 | +549 | - | + | - | + | - | + | - | + |

## APPENDIX H

## MAKING A RECORDING OF YOUR CHILD'S SOUNDS AND SPEECH

Suzanne Evans Morris, Ph.D.
January, 1982 Edition

## MAKING A RECORDING OF YOUR CHILD'S SOUNDS AND SPEECH

You have been asked to make a recording of your child's voice. The following suggestions will help obtain a recording which is typical of your child's voice and the sounds he/she is making.

1. Begin each recording with the date on which it was made and your child's age (i.e. "This is a recording of Bobby Williams which was begun on April 20, 1981. Bobby is 15 months old".).

2. Before making the recording, make a short trial recording to check out your tape recorder. Check the batteries to be sure they are strong or (preferably) use electricity if the recorder can be plugged in. Be sure that the recorder is close enough to you or the child that voices can be picked up easily.

3. Find a semi-hidden spot for the tape recorder which is close to the child. Do not cover the small microphone on the recorder. However, you may want to put some books or pillows or other familiar objects on or around the tape recorder. Much of this will depend upon your child's reaction to the tape recorder. Many children don't even notice it; others will stop talking and stare at it constantly when it is around.

4. Children often give different kinds of sounds in different situations. The sounds made when the child is alone or playing with toys or talking to himself/herself while lying in bed are often different from those made while talking or babbling with another person.

   If your child makes sounds when alone and also with a person, try tape recording in both situations.
   a. Alone in bed or talking to toys, a mobile etc. (not direct talking or babbling to you or another person).
   b. Talking or Vocalizing directly to another person.

5. Identify the general situation in which the sounds are occurring. This can be done informally as the recorder is on (i.e. "Bobby is lying on his back and talking to a mobile above his bed"; "Bobby is sitting on my lap and babbling/talking to me"). Both situation and the child's physical position should be mentioned.

6. Please mention any physical problems or strong body tensions which your child is experiencing when making sounds. For example, "Bobby's jaw is very wide open now when he is cooing" or "His tongue keeps moving back and forth in his mouth and pushing out like it does when he is eating" or "His legs and shoulders just got very tight".

7. Expect to make the tape recording over a period of several days or a week. You want to obtain as great a variety of sound and voice patterns as possible. Most children will not voice just when you want them to and have the tape recorder going. They will give different sounds at different times. It will be easier for you if you accept this and don't feel pressure to get everything at once!

8. You may be unable to record some of the newer sounds which your child is making. These often occur so infrequently that it is not possible to get them on the tape. Please mention or attempt to imitate on the end of the tape other sounds which you have heard your child make.

9. The length of the tape recording will depend upon your child. If your child is producing only a few pleasurable sounds and crying, you may be able to get a typical example of the sounds in 5-10 minutes. If your child has a variety of sounds and babbles or vocalizes a lot, you may want to tape record a wider variety of sounds and situations. The tape may run for 45 minutes. Do not record on more than 1 side of the tape.

10. Spend several days listening to your child before you make the tape recording. Identify the types of sounds which are made and the situations in which they occur. You may wish to write some of this down as a reminder of the types of sounds and situations you hope to get on the tape.

11. Try to get examples of the following types of sounds on the tape if your child is making them:

    a. Crying: Some children have only one kind of cry. Others have cries which sound different for different needs or situations (i.e. hunger, anger, fussy or irritable). Try to record a variety of your child's cries if there are different kinds.

    b. Sound Play: This includes the happier, non-crying sounds which infants and young children make when they are by themselves or with other people. These sounds may include the following types:

       1. Cooing of Vowels (ah....; ooo...).
       2. Combination of a Consonant and a Vowel (gah; buh).

3. Combination of More than One Consonant and Vowel (gah-gah-gah; duh-duh). This may be a repetition of the same sounds (gah-gah) or combinations of different sounds (duh-bah-mah).

c. Words: If your child has begun to say words, try to include some of these on the tape. If possible, figure out situations where the words will occur spontaneously (directly from the child without your asking for imitation of your words).

If it is difficult to get the words or sentences spontaneously in the natural situation, you may ask the child to say or imitate some of the words which you have heard in the past.

Most young children have words which are understood more easily by their parents than by strangers. If would help if you would repeat the word which you think your child said. In this way the "adult translation" will also be recorded.

---

CHILD'S NAME _____ AGE _____

Please return the completed tape by _____

The tape sould be sent to/given to _____

_____

_____

If you have any questions call _____

phone number _____

# APPENDIX I

## PROCEDURES FOR ELICITING PHONATION AND SOUND PRODUCTION

## PROCEDURES FOR ELICITING PHONATION AND SOUND PRODUCTION

The young child frequently produces either less phonation or a more limited quantity and variety of sound in the clinical setting with relative strangers than when at home or when playing alone. This provides a special challenge to the examiner who desires to obtain a sample of phonation and sound play for analysis with the Pre-Speech Assessment Scale.

### A. Individual Styles

Procedures for eliciting the widest variety of sound production and the most typical patterns of phonation will vary with the examiner's knowledge of the child and his or her patterns of behavior.

The examiner should seek answers to the following questions from the child's parents:

1. When is the child most vocal? With people? With toys? When alone? With pictures or books?
2. How does physical contact, roughhousing, etc, affect phonation? Is this enjoyed? Are there many happy or emotional sounds? Is there rejection of physical contact?
3. What is the general amount of phonation produced at home? How does this compare with what has been heard in the early portions of the evaluation?
4. What types of sounds and ways of combining sound have the parents heard at home? If the child uses mostly words, is there any non-word sound play? Did the child go through a period of babbling at an earlier stage of development?

This information can assist the examiner in identifying the situations which may be more conducive to producing phonation. For example, some children are extremely quiet when looking at pictures, prefering to point and have the mother name the pictures. The same child might be very vocal when playing actively with toys. If this were the case, the examiner would probably obtain more naming and vocal responses if the child were given toys such as a train, car, toy cat, or cow rather than a book with pictures of objects and animals. Other children, however, may be more vocal with pictures in a book, or with physical roughhousing, or when playing alone in a corner of the room. The child's individual style should be taken into consideration as the examiner develops a plan for obtaining a typical sample of phonation and sound production for analysis.

### B. The Child at a Non-Word Level of Production

When the child has a history of producing only vowels, single consonant-vowel syllables, or sequenced consonant-vowel combinations at a non-meaningful level, the examiner should rely on relatively informal means for eliciting production. In many cases the parents will be most successful in getting the child to vocalize. The parent should be asked to play or interact with the child in an attempt to get vocalization and "talking". The parent's knowledge of the child will determine the use of specific materials such as toys or books. The examiner should have picture books of animals and a variety of small toys (such as small rubber animals, car, boat, airplane, train) available if the parent prefers to use these.

### C. The Child at the Word or Phrase Level of Production

When the child typically uses single words, special problems arise in making a full assessment of phonation and sound production. Because of early difficulties with duration of phonation, or with obtaining the movements or speed needed for consonant production, the child may move directly from non-meaningful vowels or consonant-vowel syllable production into words. Although words are produced, they are limited in their variety of vowels and consonants and consist only of a single vowel or single consonant-vowel syllable. In addition, the stress of added meaning and content or the increased structural complexity may cause further difficulties with respiratory-phonatory control or may reduce the precision of articulation. The examiner is faced with a complex task. Two separate pictures of the child must be obtained.

Initially the variation in production at the word and phrase level must be explored. Spontaneous speech produced by the child should be supplemented by the elicitation of words or phrases which contain specific constructions. This will allow the examiner to determine the child's range of abilities when faced with either more complicated sounds or longer or more complex combinations of sounds.

If the child's abilities show normal variations in the sounds produced at the word or phrase level for the pre-speech categories evaluated by the Pre-Speech Assessment Scale, further exploration at lower levels is unnecessary.

If the child shows one or more abnormal behaviors in the subcategories of Respiration-Phonation (i.e., initiation, duration, loudness, pitch and intonation, voice quality) or Sound Play (i.e., jaw movement during phonation, tongue movement during phonation, lip movement during phonation, velopharyngeal movement during phonation), the examiner must explore the child's abilities at lower levels of meaningfulness and production. This is needed to find the lowest level of skill required to produce either acceptable phonation or more normal movement of the articulators. A beginning level for treatment can be established from a base of ability rather than disability. This allows the therapist to begin from a point where the child is experiencing more normal feedback and gradually transfer the skill into the more difficult areas.

The child's productive abilities appear to be related to the interaction of structural complexity and level of meaningfulness. Therefore, the examiner needs to find eliciting situations or materials which can sample these lower levels of both meaningfulness and complexity.

This is frequently difficult with an older child who prefers to produce only words. With some children it is possible to return to the earlier non-meaningful levels through games in which the child and examiner converse in a "foreign language" or in "moon talk", or pretend to be detectives speaking a code language. This adds an element of silliness and freedom to produce sounds in novel ways. With many children this exploration of early sound sequences is difficult to obtain.

Many children appear to need the structure of their more familiar naming responses to produce a vocal response. For this reason, the parallel use of animal or toy names and the sounds which they produce can be effective. This may elicit responses which can be evaluated at both the word and non-word levels of production. Although animal sounds or noises produced by cars or trains cannot be considered totally non-meaningful, they do not carry the naming or labeling aspects of other words. Their semantic or informational content is low. They are also relatively simple in their structural components. Informal experience in the treatment of cerebral palsied children with difficulties in the areas of respiration-phonation or limited sound play has suggested that imitation and exploration of environmental sounds frequently results in a better vocal response.

D. Specific Procedures for Eliciting Different Levels of Production

Pictures or books should be utilized which show the wide variety of animals listed on the Recording Sheet for Elicited and Spontaneous Phonation and the Recording Sheet for Elicited and Spontaneous Sound Production. Various small animals, a toy car, boat, airplane, and train should also be available.

Information from the parents should be obtained which indicates the type of situation in which the child is most vocal. This would determine whether free play with the animals or books, or interaction with another person might be most successful in obtaining vocal responses.

The evaluation should be informal and geared toward play with the child. The exact order of pictures and responses is unimportant. Although it would be easier for the examiner to have the child produce responses in a specified order, this is not realistic for a younger child.

Because various levels of complexity and meaningfulness will be produced in a random order, it will be easier for the examiner to tape record the child's responses. This is preferable to transcribing the child's responses directly. Tape recording of responses may be less necessary if the child is producing few vocalizations, if the vocal responses are all similar in their degree of normalcy or abnormality, and if the primary elicitor of vocalization is not the examiner. It is impossible to make direct transcriptions if the examiner's prime task is interacting with the child to obtain a vocal sample.

The young child's familiarity with many animals and transportation vehicles is dependent upon age, and family or environmental experience. It may be necessary for the examiner to ask the child to identify different animals through pointing in order to discover his or her familiarity with their names and sounds. If the child does not know a specific animal, the examiner may name it, talk about the animal and imitate the sounds which it produces. If the evaluation is to be continued at a later time, the examiner may suggest that the parents continue the informal teaching and exploration of animal and environmental names and sounds at home.

Questions to elicit either a single word, a phrase or an environmental sound should be used. These should be interspersed with informal comments about the animal or picture to prevent the child from responding with feelings that the examiner is always expecting a response.

If the child does not respond with spontaneous production of sounds, the examiner may attempt to obtain a response through imitation. If the child gives a response in imitation, this should be noted on the recording sheet.

The examiner should note on paper or through commentary on the tape recording the visible aspects of the child's speech production. It is necessary to identify the presence of associated reactions, presence of abnormal movement patterns such as jaw thrust or lip retraction, and normal features such as the amount of lip rounding and area of tongue contact with elevation. Many scoring decisions on the Pre-Speech Assessment Scale are based upon the frequency of abnormal movement patterns or the quality or precision of normal movement. The examiner would not be able to evaluate these features from a tape recording alone.

E. Recording the Child's Responses

The manner of preparing the child's responses for scoring on the Pre-Speech Assessment Scale will vary according to the type and consistency of responses produced.

1. Responses Which Are Limited in Type or Frequency

If the child's responses are limited in their type, degree of normalcy or abnormality, or their frequency, it may not be necessary to transcribe and analyze each response. This is frequently the case with children who show either clear-cut normal or abnormal responses in specific categories with very limited variation of response. For example, if the child produces only bilabial consonants, central vowels, and phonation which is consistently of short duration, normal pitch and intonation, and of a strained quality, scoring will be fairly clear cut in both normal and abnormal areas for each category.

2. Responses Which Are Variable or Related to the Degree of Complexity or Meaningfulness

Since scoring in normal and abnormal areas is often dependent upon the frequency of occurrence of the normal or abnormal feature, scoring will be more difficult when the child shows a mixture of normal and abnormal performance.

With a mixture of ability and disability, the examiner may need a more formal means of recording and analyzing the child's performance. The following procedure is recommended for preparing the vocal sample for analysis.

a. All responses should be tape-recorded along with relevant comments pertaining to physical characteristics of production (i.e., tension, abnormal movement patterns)

b. Responses should be transcribed and listed on the Recording Sheet for Elicited and Spontaneous Phonation and the Recording Sheet for Elicited and Spontaneous Sound Production. Spaces have been provided both for suggested elicited responses and for those which the child spontaneously produces.

c. When listing the child's responses, they should be grouped according to the structure and level of meaningfulness which the child produces. For example, if the child produces the word "bunny" as "buh", it should be listed as a CV word rather than as a CVCV word. Although the word appears on the CVCV area of the recording sheet, it should be written by the examiner on one of the blank lines representing the less complex level of CV production. The examiner may wish to indicate in the CVCV section that the child produced the word "bunny" with a single syllable structure.

d. The examiner should always indicate whether the response was spontaneously produced or produced in direct imitation (i.e., S or I).

e. Phonetic notations or transcriptions should be used where possible.

f. Notations related to the child's physical use of the tongue, jaw and lips should be included on the recording sheet for analysis of sound production.

F. Analyzing the Child's Responses

As the child's response is listed on the recording sheet, the examiner should evaluate its adequacy in each of the phonatory areas. Descriptive symbols are suggested for each area on the recording sheet (i.e., +, -, V, X). A descriptive word or comment may also be added when a negative quality is present.

For example, the comments " strangled," "open laryngeal bloc," or "increased laryngeal tension" might be placed in the appropriate column. Descriptions of normal and abnormal behaviors for each area are listed in the body of the Pre-Speech Assessment Scale. They should form the criteria for the symbols used by the examiner (see Figure 1).

Responses listed on the Sound Production Recording Sheet should be analyzed according to the criteria for each subcategory. For example, under Jaw Movement During Phonation, one should note whether abnormal movements occurred and the type of vowel which the child produced (i.e., high, low, central, diphthong). The examiner should become fully familiar with the distinctions which should be made and noted for each section (see Figure 2).

The recording sheets should be used in determining the appropriate scores for the child. Estimates of the type of sound production, adequacy of features such as duration or loudness can be observed by counting the frequency of normal or abnormal production.

| VERBAL MATERIAL | How Elicited (S or I) | Initiation Ease (+ -) | Initiation Voicing (V ✗) | Duration (+ - ) | Loudness (+ -) | Pitch ( + - ) | Intonation (↗↘→) | Quality (+ - ) |
|---|---|---|---|---|---|---|---|---|
| B. WORDS | | | | | | | | |
| 2. CV or CVC | | | | | | | | |
| b. Voiced | | | | | | | | |
| DOG (dɑ) | S | + | V | + Tension | — | + | ↘ | — strangled |
| GOAT (go) | I | + | V | + Tension | — | + | ↗ | + |
| BABY (bɑ) | S | + | V | + Tension | — | + | → | + |
| DUCK (dʌ) | S | + | V | + Tension | — | + | → | — strangled |
| CAT (gæ) | S | + | V | + | — | + | ↘ | + |
| c. Voiceless | | | | | | | | |
| CAT (g/k) | S | | | | | | | |
| COW (tɑʊ) | I | + | ✗ | + | — | + | → | — breathy |
| PIG (pɪk) | I | + | ✗ | + | — | + | → | — breathy |
| CAR (g/k) | S | | | | | | | |

Figure 1. Analysis of Phonation.

| VERBAL MATERIAL | How Elicited (S or I) | Jaw | Tongue | Lips | Velopharynx |
|---|---|---|---|---|---|
| A. NON-WORDS | | | | | |
| 1. CV or CVC | | | | | |
| MEOW (cat) /miau/ | S | /i/ - high<br>/au/ - diphthong | /i/ - spread | /m/ - bilabial<br>/au/ - rounded<br>/i/ - spread | /m/ - nasal |
| MOO (cow) /mu/ | S | /u/ - high | | /m/ - bilabial<br>/u/ - rounded | /m/ - nasal |
| BAA (sheep) /ba/ | S | /a/ - low (thrust) | | /b/ - bilabial | /b/ - oral |
| NEIGH (pony) /da/ | S | /a/ - low (thrust) | /d/ - front | | /d/ - oral |
| PUH-PUH (boat) /pə/ | S | /ə/ - central (thrust) | | /p/ - bilabial | |

Figure 2. Analysis of Sound Production.

APPENDIX J

RECORDING SHEET FOR
ELICITED AND SPONTANEOUS PHONATION

RECORDING SHEET FOR ELICITED AND SPONTANEOUS PHONATION

NAME: _____

| VERBAL MATERIAL | How Elicited (S or I) | Initiation Ease (+ -) | Initiation Voicing (V ✓) | Duration (+ - ) | Loudness (+ - ) | Pitch (+ -) | Intonation (↗↘→) | Quality (+ - ) |
|---|---|---|---|---|---|---|---|---|
| A. NON-WORDS | | | | | | | | |
| 1. Vowel (V) | | | | | | | | |
| O-O-O-O-O (train) | | | | | | | | |
| E-E-E-E-E (mouse) | | | | | | | | |
| UH-OH! | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 2. CV or CVC | | | | | | | | |
| MEOW (cat) | | | | | | | | |
| MOO (cow) | | | | | | | | |
| BAA (sheep) | | | | | | | | |
| NEIGH (pony) | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 3. CVCV | | | | | | | | |
| PEEP-PEEP (chick) | | | | | | | | |
| WOW-WOW (dog) | | | | | | | | |
| QUACK-QUACK (duck) | | | | | | | | |
| MAH-MAH (goat) | | | | | | | | |

RECORDING SHEET FOR ELICITED AND SPONTANEOUS PHONATION

| VERBAL MATERIAL | How Elicited (S or I) | Initiation Ease (+ -) | Initiation Voicing (V ✗) | Duration (+ - ) | Loudness (+ - ) | Pitch (+ -) | Intonation (↗ ↘ →) | Quality (+ - ) |
|---|---|---|---|---|---|---|---|---|
| CVCV | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| B. WORDS<br>1. Vowel (V)<br>OW (L) | | | | | | | | |
| EYE or HI | | | | | | | | |
| EA (R) | | | | | | | | |
| EA (T) | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 2. CV or CVC<br>a. Nasal<br>NOSE | | | | | | | | |
| MOUTH | | | | | | | | |
| MINE | | | | | | | | |
| MORE | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| b. Voiced<br>DOG | | | | | | | | |
| BIRD | | | | | | | | |
| DUCK | | | | | | | | |
| GOAT | | | | | | | | |

RECORDING SHEET FOR ELICITED AND SPONTANEOUS PHONATION

| VERBAL MATERIAL | How Elicited (S or I) | Initiation Ease (+ -) | Initiation Voicing (V ∿) | Duration (+ - ) | Loudness (+ - ) | Pitch (+ -) | Intonation (↗ ↘ →) | Quality (+ - ) |
|---|---|---|---|---|---|---|---|---|
| 2. CV or CVC<br>b. Voiced (cont'd) | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| c. Voiceless<br>CAT | | | | | | | | |
| COW | | | | | | | | |
| PIG | | | | | | | | |
| SHEEP | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 3. CVCV<br>a. Nasal<br>BUNNY | | | | | | | | |
| PONY | | | | | | | | |
| MAMA | | | | | | | | |
| NIGHT-NIGHT | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| b. Voiced<br>BYE-BYE | | | | | | | | |
| BABY | | | | | | | | |

RECORDING SHEET FOR ELICITED AND SPONTANEOUS PHONATION

| VERBAL MATERIAL | How Elicited (S or I) | Initiation Ease (+ -) | Initiation Voicing (V ✱) | Duration (+ - ) | Loudness (+ - ) | Pitch (+ - ) | Intonation (↗ ↘ →) | Quality (+ - ) |
|---|---|---|---|---|---|---|---|---|
| 3. CVCV<br>b. Voiced (cont'd)<br>YUM-YUM (food) | | | | | | | | |
| BUNNY | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| c. Voiceless (CVCV)<br>KITTY | | | | | | | | |
| PUPPY | | | | | | | | |
| PONY | | | | | | | | |
| HORSIE | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| PHRASES<br>ALL GONE... | | | | | | | | |
| BYE-BYE (KITTY, MAMA...) | | | | | | | | |
| NIGHT-NIGHT (BABY, SHEEP...) | | | | | | | | |
| TURN PAGE | | | | | | | | |
| TWO (PUPPIES, KITTIES...) | | | | | | | | |
| MAMA (CAT, DOG...) | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

APPENDIX K

RECORDING SHEET FOR
ELICITED AND SPONTANEOUS SOUND PRODUCTION

## RECORDING SHEET FOR ELICITED AND SPONTANEOUS SOUND PRODUCTION

NAME: _____

| VERBAL MATERIAL | How Elicited (S or I) | Jaw | Tongue | Lips | Velopharynx |
|---|---|---|---|---|---|
| A. NON-WORDS<br>1. Vowel (V) or Consonant (C)<br>OOOOOOOO (train) (owl) | | | | | |
| EEEEEE (mouse) | | | | | |
| UH-OH! | | | | | |
| FFFFFF (angry cat) | | | | | |
| SH-SH-SH (be quiet) | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 2. CV or CVC<br>MEOW (cat) | | | | | |
| MOO (cow) | | | | | |
| BAA (sheep) | | | | | |
| NEIGH (pony) | | | | | |
| | | | | | |

RECORDING SHEET FOR ELICITED AND SPONTANEOUS SOUND PRODUCTION

| VERBAL MATERIAL | How Elicited (S or I) | Jaw | Tongue | Lips | Velopharynx |
|---|---|---|---|---|---|
| 2. CV or CVC (cont'd) | | | | | |
| | | | | | |
| | | | | | |
| 3. CVCV<br>PEEP-PEEP (chick) | | | | | |
| WOW-WOW (dog) | | | | | |
| KAK-KAK (duck) | | | | | |
| MAH-MAH-MAH (goat) | | | | | |
| OINK-OINK (pig) | | | | | |
| CHOO-CHOO-CHOO (train) | | | | | |
| PUH-PUH-PUH (boat) | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

RECORDING SHEET FOR ELICITED AND SPONTANEOUS SOUND PRODUCTION

| VERBAL MATERIAL | How Elicited (S or I) | Jaw | Tongue | Lips | Velopharynx |
|---|---|---|---|---|---|
| B. WORDS<br>1. Vowel (V)<br>OW (L) | | | | | |
| EYE or (H)I | | | | | |
| EA (R) | | | | | |
| EA (T) | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 2. CV or CVC<br>PIG | | | | | |
| BIRD | | | | | |
| LAMB | | | | | |
| NOSE or NO | | | | | |
| DOG | | | | | |

RECORDING SHEET FOR ELICITED AND SPONTANEOUS SOUND PRODUCTION

| VERBAL MATERIAL | How Elicited (S or I) | Jaw | Tongue | Lips | Velopharynx |
|---|---|---|---|---|---|
| DUCK | | | | | |
| CAT | | | | | |
| COW | | | | | |
| GOAT | | | | | |
| SHEEP | | | | | |
| FISH | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 3. CVCV<br>BUNNY | | | | | |
| PUPPY | | | | | |
| PONY | | | | | |
| MAMA | | | | | |

RECORDING SHEET FOR ELICITED AND SPONTANEOUS SOUND PRODUCTION

| VERBAL MATERIAL | How Elicited (S or I) | Jaw | Tongue | Lips | Velopharynx |
|---|---|---|---|---|---|
| BABY | | | | | |
| BYE-BYE | | | | | |
| NIGHT-NIGHT | | | | | |
| KITTY | | | | | |
| HORSIE | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| C. PHRASES<br>BYE-BYE (mama, mouse, lamb) | | | | | |
| NIGHT-NIGHT (baby, sheep, bunny) | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# APPENDIX L

## SIGNIFICANT COMPONENTS OF MOVEMENT DURING FEEDING

# SIGNIFICANT COMPONENTS OF MOVEMENT DURING FEEDING

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## SIGNIFICANT COMPONENTS OF MOVEMENT DURING FEEDING

The following components of oral movement were seen in a longitudinal study of six normal infants who were observed and filmed between birth and 36 months (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 18, 21, 24, 36 months).

I. SUCKING

| Feeding Behavior | Age Range of Acquisition | Presence in 2/3 of Group | Age Range of Disappearance | Absence in 2/3 of Group | Significance in Later Development of Feeding and Speech Movements |
|---|---|---|---|---|---|
| 1. Unstabilized jaw movement with the cup. | 4-7 months | 5 months | Reduction in range and frequency from 18-36 months. Full disappearance in one child. | Reduction in frequency in 1/2 of group at 24 months and 36 months. | Some degree of stability of a central or proximal part is required for rapid control and separation of distal movements. The jaw represents the area of needed proximal control for precise oral function. The gradual assumption of external and then internal jaw stabilization during drinking allows for greater separation of tongue from jaw movement and for greater skill and precision of lip movement for both feeding and speech. |
| 2. External jaw stabilization through biting on cup. | 11-24 months | Not present at a single age but seen in 2/3 of group at different times. | 18-36 months | 21 months | |
| 3. Internal jaw stabilization through muscle co-activation. | 18-36 months | 36 months | Maintained. | --- | |
| 4. Jaw separates from the tongue in sucking. | 7-11 months | 11 months | Maintained. | --- | Mechanical separation of the jaw from the tongue provides a sensory impression of independent movement of the tongue. |
| 5. Cupped grooving of the tongue during sucking. | 0-1 month | 0 months | Maintained. Amount of cupping becomes reduced. | --- | Changes in the internal configuration of the tongue are required for many vowels and grooving is required for sibilant consonants (/s/,/z/,/sh/,/ʒ/). |
| 6. Extension-retraction suckle with bottle or breast. | 0-3 months | 1 month | 5-9 months | --- | The extension-retraction pattern provides a smooth unbroken rhythm for early feeding. The extension movement is later retained and used for cleaning of the lips by the tongue, for early raspberry sounds in sound play (approx. 6 months) and in the /th/ consonants. The extension-retraction suckle is replaced in feeding by the true suck. |
| 7. Extension-retraction suckle with the cup. | 4-6 months | 5 months | 5 - +36 months | 11 months | |
| 8. Extension-retraction suckle with the spoon. | 1-6 months | 2 months | 9 - +36 months | 18 months | |

| Feeding Behavior | Age Range of Acquisition | Presence in 2/3 of Group | Age Range of Disappearance | Absence in 2/3 of Group | Significance in Later Development of Feeding and Speech Movements |
|---|---|---|---|---|---|
| 9. Up-down suck pattern of the tongue with bottle or breast. | 5-9 months | 9 months | Maintained throughout bottle feeding. | --- | The development of tongue movement in the vertical up-down plane sets the stage for more advanced feeding movements. These include the development of munching and chewing and the development of tongue and jaw separation. The latter development allows for upward movement of the tongue for /t/,/d/,/n/, and /l/ phonemes. |
| 10. Up-down suck pattern of the tongue with the cup. | 5-11 months | 8 months | Maintained | --- | |
| 11. Up-down suck pattern of the tongue with the spoon. | 7-12 months | 11 months | Maintained | --- | |
| 12. Quieting or inhibition of jaw and tongue movement as child anticipates entrance of the spoon. | 4-7 months | 6 months | Maintained | --- | The quieting of tongue and jaw movement provides the needed stabilization for separation and downward-forward movement of the upper lip in spoon feeding. This is used to clean the spoon. |
| 13. Cleans lips with tongue with up-down and sweeping motions. | 12 - +36 months | 36 months | Maintained | --- | This represents a full separation of tongue from jaw movements in upward, downward and lateral directions. |
| 14. Liquid loss with bottle or breast. | 0-1 month | 0 months | 1-9 months<br>Much variability | 9 months | This indicates higher degrees of coordination between lip, cheek and tongue movements during sucking and swallowing. It is often an indication of tightening of the lateral borders of the lips. |
| 15. Upper lip comes forward and down to assist in cleaning food from spoon. | 5-8 months | 7 months | Maintained | --- | The development of independent and discrete movements of the upper and lower lips paves the way for the development of bilabial (m, p, b) and labiodental (f, v) sounds. |
| 16. Lower lip draws inward after spoon removal. | 4-12 months | 7 months | Maintained | --- | |
| 17. Lower lip draws inward and food is cleaned or retrieved from it by upper incisors. | 9-21 months | 15 months | Maintained | --- | The drawing in of the lower lip with contact of the upper incisors is used in the labiodental consonants (f and v). |

II. SWALLOWING

| Feeding Behavior | Age Range of Acquisition | Presence in 2/3 of Group | Age Range of Disappearance | Absence in 2/3 of Group | Significance in Later Development of Feeding and Speech Movements |
|---|---|---|---|---|---|
| 18. Suckle-swallow protrusion of tongue with liquids. | 0-2 months | 1 month | 7-11 months | 11 months | The suckle-swallow protrusion indicates a lack of independence of swallowing from sucking. |
| 19. Suckle-swallow protrusion of tongue with semi-solids. | 1-6 months | 2 months | 9-11 months | 11 months | |
| 20. Simple tongue protrusion with liquids. | 4-11 months | 11 months | 10 - +36 months | +36 months 1/2 showed absence at 24 months | The simple protrusion of the tongue during swallowing is seen in the interdentalized consonant (th). It may also be observed in early production of /s/, /z/, /sh/, and /zh/ in which the sibilant consonant is produced incorrectly in an interdentalized fashion. |
| 21. Simple tongue protrusion with semi-solids. | 2-? months | 12 months | 9 - +36 months | 24 months | |
| 22. Simple tongue protrusion with solids. | 5-9 months | 7 months | 8 - +36 months | +36 months 1/2 showed absence at 24 mos. Protrusion was absent or very infrequent in 5/6 of group at 36 months. | |
| 23. Elevated tongue with jaw separation for liquids. | 8 - +36 months | 11 months | Maintained | --- | As the tongue remains mechanically elevated as the jaw separates and moves downward, the child experiences the independence of the tongue and probably develops a perception of tip-alveolar contact. This sensory-motor experience will provide a target which will be returned to later as true tongue-tip elevation is developed The acquisition of tongue-tip elevation is critical for many consonants (such as t,d,n,l). |
| 24. Elevated tongue with jaw separation for semi-solids. | 10 - +36 months | 11 months | Maintained | --- | |
| 25. Elevated tongue with jaw separation for solids. | 7 - +36 months | 11 months | Maintained | --- | |
| 26. Lip closure in swallowing liquids. | 0-11 months | 11 months | Maintained | --- | This represents the coordination of lip movement with tongue and jaw movements during the swallow. |
| 27. Lip closure in swallowing semi-solids. | 1-9 months | 8 months | Maintained | --- | |
| 28. Lip closure in swallowing solids. | 7-? months Extremely variable | 18 months Extremely variable | Maintained Inconsistently | --- | |

| Feeding Behavior | Age Range of Acquisition | Presence in 2/3 of Group | Age Range of Disappearance | Absence in 2/3 of Group | Significance in Later Development of Feeding and Speech Movements |
|---|---|---|---|---|---|
| 29. Liquid loss during sucking and swallowing of liquids from a cup. | 4-6 months | 5 months | 11-36 months | 24 months | The utilization of lip, jaw and tongue control in the handling of liquids and semi-solids requires a fine degree of coordination in all areas. This may be observed in the child's ability to suck and swallow foods without loss of food or saliva. |
| 30. Food or saliva loss in sucking and swallowing or pureed foods. | 1-6 months | 1 month | 6-18 months | 12 months | |
| 31. Suck-swallow transition poorly coordinated with breathing: i.e., coughing and choking with cup. | 5 - 7 months Variable | 11 months Inconsistently | 5-15 months Inconsistent Coughing to +36 months | 15 months | The gradual development of a smooth, rapid and well-coordinated suck-swallow-breathe transition indicates increased amounts of coordination between the oral-motor and respiratory systems. The smooth overlapping movements occurring in the later stages are reminiscent of the overlapping of movements of articulatory and respiratory-phonatory systems required for co-articulation. |
| 32. Continuous sucks from the cup; poorly coordinated with swallowing. | 5-6 months | 5 months | 6-12 months | 11 months | |
| 33. Takes 1-3 sucks from the cup and stops or pulls back. | 6-8 months | 8 months | Variable | Maintained as an alternative at 36 months | |
| 34. Suck-swallow sequences greater than 3 sucks with intake of 1 oz. or more of liquid. | 9-15 months | 15 months | Maintained | --- | |
| III. BITING AND CHEWING | | | | | |
| 35. Uses sucking or suckling only for biting. | 4-5 months | 5 months | 6-9 months | 9 months | Rhythmical bite-and-release movements of the phasic bite reflex are incorporated into the early munching-chewing pattern. The presence of the phasic pattern is another indication of rhythmicity in the child's developing system. |
| 36. Uses a phasic bite-release with no or minimal bite-through with soft cookies. | 5-9 months | Variable | 9-12 months | 11 months | |
| 37. Uses a phasic bite-release with no or minimal bite-through for hard cookie or large pretzel. | 6-19 months | Variable | 8-21 months | 18 months | |

| Feeding Behavior | Age Range of Acquisition | Presence in 2/3 of Group | Age Range of Disappearance | Absence in 2/3 of Group | Significance in Later Development of Feeding and Speech Movements |
|---|---|---|---|---|---|
| 38. Controlled bite on soft cookie. | 7-12 months | 11 months | Maintained | --- | In order to use a controlled bite the child must have the beginnings of jaw stability, the ability to grade and vary the extent of jaw movement, and the ability to vary the degree of biting force or pressure. Each of these movement components has many counterparts in later speech production. |
| 39. Controlled bite on hard cookie or large pretzel. | 11-24 months | 18 months | Maintained | --- | |
| 40. Head extension or other associated movement with soft cookie. | 7-11 months | Variable | 5-12 months | 11 months | Rapid, precise movements of all kinds (including those of speech production) are dependent upon the ability to perform discrete movements. The gradual ability to bite through foods of different thicknesses without associated movements of the head and body represents an aspect of independence of jaw movement from head and shoulder movement. It is also an indication of a more powerful and well-controlled jaw in biting. |
| 41. Head extension or other associated movement with hard cookie or large pretzel. | 10-18 months | Variable | 12-24 months | 18 months | |
| 42. No chewing. Sucking or suckling only with food. | 4-5 months | Variable | Variable | 7 months | Vertical jaw movements predominate during chewing and speech. In both functions they gradually become more variable and less stereotyped in their extent and speed of movement. |
| 43. Stereotyped phasic bite and release pattern in chewing. | 5-9 months | Variable | Variable depending on food type and placement. | 11 months | |
| 44. Non-stereotyped variable vertical chewing pattern of the jaw. | 5-11 months | 8 months | Maintained | --- | |
| 45. Diagonal-rotary pattern of the jaw to the side of food placement. | 5-9 months | 8 months | Maintained | --- | Diagonal jaw movements are reflective of greater tongue lateralization. Initially the jaw appears to assist the tongue in moving to the side. At later stages the tongue is able to move independently but the jaw may continue to be involved in the lateral movement. Lateral or rotary movements of the jaw are also an incidental or secondary accompaniment to adult speech production. |
| 46. Circular-rotary pattern of the jaw in transferring food across midline. | 24 - +36 mos. | 36 months | Maintained | --- | |

| Feeding Behavior | Age Range of Acquisition | Presence in 2/3 of Group | Age Range of Disappearance | Absence in 2/3 of Group | Significance in Later Development of Feeding and Speech Movements |
|---|---|---|---|---|---|
| 47. Extension-retraction movements of the tongue mixed with chewing. | 5 - ? months Variable | 7 months | 10 - +36 mos. | 18 months | These are observed primarily when the child is experiencing some difficulty in moving or transferring the food. |
| 48. Munching. | 5-9 months | 6 months | Maintained | --- | Munching represents the initial stage of chewing and the child's ability to combine biting movements with sucking movements. The combining of movements is seen in production of diphthongs and affricates (ch, j). |
| 49. Tongue lateralization with food placement on the side. | 5-9 months | 7 months | Maintained | --- | The development of tongue lateralization represents an important stage in the acquisition of independence of tongue movement. Initially, movement is assisted by jaw movement. True independence of tongue movement from jaw movement appears during the second year. Often food transfer is accomplished through the separation of a discrete tip of the tongue which then shifts the food in a rapid flip-like transfer. The independence of tongue from jaw movement is important for rapid tongue movements in speech acquisition. |
| 50. Tongue lateralization and transfer of food from the center to both sides. | 7-12 months | 8 months | Maintained | --- | |
| 51. Tongue lateralization in transferring food from one side to the other across midline. | 21 - +36 mos. | 24 months | Maintained | --- | |
| 52. Tongue transfers food from right-to-left and left-to-right across midline. | 21 - +36 mos. | 36 months | Maintained | --- | |
| 53. Tongue tip separates from jaw and elevates to clean the lips or buccal cavity. | 18 - +36 mos. | 36 months | Maintained | --- | |
| 54. Tongue separates from jaw and moves the food laterally while the jaw remains in midline. | 12 - 36 months | 24 months | Maintained | --- | |
| 55. Lips are active with the jaw and make some mechanical contact during chewing. | 5-9 months | 9 months | Maintained | --- | Gradual separation of lip from jaw movement sets the stage for rapid, precise production of bilabial consonants (m,p,b). |

| Feeding Behavior | Age Range of Acquisition | Presence in 2/3 of Group | Age Range of Disappearance | Absence in 2/3 of Group | Significance in Later Development of Feeding and Speech Movements |
|---|---|---|---|---|---|
| 56. Upper lip moves actively forward and down during chewing. | 8-12 months | 9 months | Maintained | --- | (See number 55.) |
| 57. The upper or lower lip is drawn actively inward during chewing. | 5-9 months | 7 months | Maintained | --- | |
| 58. The corner of the lip or cheek is drawn actively inward during chewing. | 8-11 months | 11 months | Maintained | --- | The inward tightening of the cheeks and participation of the corners of the lips assists the tongue in transferring food from the side to the center of the mouth. It prevents food from leaking into the buccal cavity and assists in the formation of a bolus for swallowing. Inward tightening of the cheeks is observed in maintaining a forward direction of the airstream during speech and in the prevention of lateral air leakage in fricative consonants (f, v, sh, zh, s, z). |
| 59. Cheeks are used actively to control or move the food. | 8-18 months | 11 months | Maintained | --- | |
| 60. Upper incisors are used to clean or retrieve food from the lower lip during chewing. | 8-12 months | 12 months | Maintained | --- | Cleaning movements of the upper incisors on the lower lip are similar to those used in the production of labio-dental consonants (f, v). In addition, cleaning of this type requires the use of a sustained semi-closure of the lips and jaw. This type of closure appears in speech in the production of many vowels, glides, and fricatives. |
| 61. Cleaning movements are smoothly integrated with chewing. | 11-36 months | 24 months | Maintained | --- | |
| 62. Chews with lips closed. | 9 - ? months Variable | 18 months Inconsistent | Maintained Inconsistent | --- | During chewing with the lips closed the child shows separation of lip and jaw movements. This is an important skill for speech production. The child does not consistently use lip closure during chewing; yet by 24 months food and/or saliva are not lost during chewing. This is an indication of the skilled coordination of tongue, lip and jaw and the child's ability to selectively use lip closure only when needed as an added deterent to food loss or as a social skill. |
| 63. Does not lose food or saliva during chewing. | 12-36 months | 24 months | Maintained | --- | |

APPENDIX M

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The following materials were utilized in developing the concepts and sequences of the Pre-Speech Assessment Scale. These are listed according to the section of the PSAS to which they apply.

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APPENDIX N

FORM: CONFUSIONS AND UNCERTAINTIES IN SCORING

## PRE-SPEECH ASSESSMENT SCALE

### Confusions and Uncertainties in Scoring

Please complete one problem-confusion form for each question you have in scoring a child. This information will help us to clarify problem areas and make further changes in the Scale.

Therapist or Evaluator:_____ Center:_____

Child's Name: Diagnosis:

Chronological Age:

Item #:

Confusion or Problem (describe):

Confusion concerns primarily the following score(s):

Score finally given to the child:

---

Child's Name: Diagnosis:

Chronological Age:

Item #:

Confusion or Problem (describe):

Confusion concerns primarily the following score(s):

Score finally given to the child:

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Child's Name: Diagnosis:

Chronological Age:

Item #:

Confusion or Problem (describe):

Confusion concerns primarily the following score(s):

Score finally given to the child:

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Please keep a number of these sheets clipped in the back of your Scale Manual. Complete a form for each confusion as it occurs in scoring. Send these forms to C.P. Project-PSAS; Curative Rehabilitation Center; 9001 West Watertown Plank Road; Wauwatosa, WI 53226.